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PLEA FOR MALARIA.

A CRITICISM ON DR. MOORE'S ARTICLE ENTITLED MALARIA *vs.* RECOGNIZABLE CLIMATIC INFLUENCES IN THE INDIAN MEDICAL GAZETTE OF NOVEMBER 1881.

BY

K. D. GHOSE, M.D., M.R.C.S.

PUBLISHED BY W. R. SMITH, ESQUIRE, F.T.S.

(Reprinted from the Indian Medical Gazette of June 1882.*)*

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A PLEA FOR MALARIA.

It is singular that Dr. Moore's article "Malaria Recognizable climatic influences" in the November number of the Indian Medical Gazette, should come out just as the October number of the Practitioner had disclosed the marvellous discovery which elucidates the manner in which the fevers, which are now so prevalent in the Campagna of Rome, were prevented, or at least suspended, during a long series of ages. My hand trembles when I hold my pen against the voice of one whose authority is well recognized, and whose vast scholarship is evinced in the paper which excites these few lines of protest. Ten years' residence and active practice in the most notoriously malarious District* of malarious Bengal is the only apology for my coming out of this place of obscurity to take arms against such an authority as Dr. Moore and vindicate the poison theory of malaria which in the article above quoted he so authoritatively ignores. And in order to do so he uses arguments which Dr. Moore would be the first to consider illogical if any one had the temerity to attempt to pass them upon him as sound.

The main argument used by Dr. Moore against the malarial theory is, that the fevers have been found prevalent where marshes do not exist, and that conversely, the fevers do not prevail *invariably* where marshes exist. I take the last first. Dr. Oldham, the staunchest opponent of the malarial theory in his book entitled "What is malaria" says "That malarious fevers frequently prevail in marshy places, requires no demonstration. To enumerate the swampy districts in which these diseases abound would be impossible. The fens of our country, the low wet flats of Holland, the moist plains of Hungary and Lombardy, the Maremma and Roman Campagna are well known as favourite haunts of paludal fevers. Damp spots however, in which malaria lurks, are to be found in every country in Europe and in almost every part of the world." If there be this *constant* though not an *invariable* connection of malaria with marshes and damp spots, is it any wonder that most of the observers have come to the general idea, that malaria is a marsh poison? Extended observation and collation of facts from different parts of the world have, however, proved that there are marshes near which these fever do not prevail. Now, should a perfectly scientific mind, from the fact of the existence of these exceptional marshes, jump to the conclusion, that there is no connection between malarious fevers and marshes? Or should he make further enquiry and see if there is any peculiarity either in the marshes themselves or in their surroundings which render them harmless and unfit to generate or maintain the activity of the malarial poison? To my mind the existence of these exceptional marshes is more fatal to the "Chill" theory of malaria than to the poison theory. The only explanation, the supporters of the former can give, as to the pretty constant connection of malarious fevers with marshes is, that in the neighbourhood of marshes the atmosphere is damp and fogs prevail, and if not protected by clothing, the system gets chilled by the damp and an attack of ague is the result. If this were true why should the damp in the atmosphere of the exceptional marshes be incapable of producing chill? It cannot be that the air in the vicinity of any marsh would be dry.

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*Rungpore.

It may be that the explanations given by the supporters of the poison theory regarding the exceptional marshes are conflicting and in many instances absurd, but as far as my reading goes, I think no enquiry on a strictly scientific method has yet been made with a view to ascertain the peculiarities which render certain marshes harmless. The latest propounders of the poison theory of malaria say that the agent which causes malarious fevers, is not given out from the water lying on a marsh, but by the marshy ground when it is exposed to the heat of the sun. "It is a well known fact that the most pestilential marshes do not produce malaria even if the temperature of the atmosphere is considerably elevated, so long as the bottom is completely covered by water." To quote from De Chaumont's edition of Parkes' Hygiéne:—" A moist soil influences greatly the development of the agent, whatever it may be, which causes the paroxysmal fevers. The factors which must be present to produce the agent are heat of soil (which is a certain point = isotherm of 65° Fahr of summer air temperature), air, moisture and some impurity of soil which in all probability is of vegetable nature." Now, a marsh may sometimes be a shallow deposit of alluvium on a basin of dense clay. In such a case the rain falling on the surrounding soil of impermeable clay would run into the marsh and keep it more or less covered with water; the texture of the soil would prevent its absorption into the surrounding country and although weeds and minute vegitable organisms generally met with in marshes will luxuriate, little or no malaria would be produced in the stiff clay soil around. There are other possibilities which might be suggested. It is a well known fact that two poisons counteract each other and neutralize or mitigate the effects of both, it is possible therefore that in these non-malarious marshes there is some other poison which antagonizes malaria and renders it ineffectual. The history of agriculture has taught us the fact that one disease of plants sometimes supplants another, and it is possible that in these exceptional marshes there is some organism which lives on the agent called malaria and destroys it as quickly as it is produced. Cinchona is a specific in malarious fevers, and is perhaps an antidote to the malarial poison. There may be trees with similar properties growing in the neighbourhood of these marshes that prevent the formation of malaria. Malaria may be a living germ as has been supposed, and is said to have been demonstrated, and must therefore be introduced and sown before it can multiply in a marsh. Perhaps it has never been introduced into the marshes where the fevers do not prevail. I will not multiply conjectures, for they are mere conjectures. But so long as there are these possible ways of explaining why a few marshes do not breed malaria, it is perfectly logical to say that as a rule marshes are the hot-bed of the poison, and like every other rule has its exceptions. On no subject is our knowledge perfect. We know that a drop of vaccine lymph introduced under the cuticle produces a definite set of results, but in certain exceptional cases it fails to do so, and we do not know why, in every case. Must we therefore conclude that, as in *every* case the living vaccine lymph does not produce the vaccine vesicle, the introdaction of the virus is not the cause of the vesicle, and build some ingenious theory to account for the phenomenon?

I now, take up the other argument of Dr. Moore's viz. that malarious fevers have been found where marshes do not exist. I begin by requoting from Dr. Parkes' book. "The factors which must be present to produce this agent are heat of soil (* * * *) air, moisture, and some impurity of soil which in all probability is of vegetable nature." These factors are almost invariably present in the neighbourhood of marshes; and that is why the supporters of the poison theory of malaria say that it is a product of marshes, otherwise there is no reason why marshes and marshes only should be the special generators of fever. If these factors, viz., heat, air, moisture and vegetable impurities in the soil be present where there is no marsh, why should it not be possible for fevers to be prevalent! Dr. Moore in adducing examples of feverish localities which to his mind, break down the malarial theory, says: "The Bickaneer district may be taken as typical. It consists of tracts of sand or stretches of sand hills on a substratum of soft sandstone. Water is three, four or more hundreds of feet from the surface. The rainfall does not exceed seven or eight inches annually, and often does not amount to five. Here a small hole of water, one could pitch a stone across, is dignified by the term of *mota talas* (big tank). The products of the sandy soil are stunted acacia, zyzyphus (with which camels are fed) rain crops of Bajree, irrigated fields being unknown, and various kinds of grass with a shrub known as *phog* and used for firewood. This is certainly not the description of a country in which malarious disease would be expected." Why not? Which of the factors above mentioned is wanting? The soil though sandy is there, its temperature is above 65° F; being loose sand air is present in its meshes in abundance down to a great depth, the subsoil water-level may be three or four hundred feet below the surface, yet moisture cannot be wanting. Possibly the few inches of rain that fall are kept in the sandy surface and prevented from percolating down by the substratum of soft sandstone, this moisture is perhaps daily evaporated by the heat of the sun and in the evening, when the rapid evaporation of heat from the sand suddenly cools the temperature, a heavy dew moistens the ground and being sandy it soaks in and is not visible as it would be where there is a thick turf to intercept it and show in pearly drops on the blades of grass. At any rate some how or other there must be damp winds, to cause the chills which according to Dr. Moore produce the fevers. Why should not the same damp serve the purpose of malarial development? Then for the impurity of the soil. It is a well-known fact that organic impurities are taken up by the ground more easily if it be loose sand than if it be hard impervious clay, specially if the rainfall be scanty. On a clay soil if the rain be heavy all the organic deposits are washed out into the streams. Whereas in Bickaneer, however insignificant the sources of those impurities are, the accumulations of months lie on the ground enter into the meshes of the superficial layer of sand and there form enough of pabulum for the fever germs.

Malaria has been found in exceptional cases on barren rocks, and this is stated as an argument against the poison theory. But it must be observed that the instances in which malaria occurs on rocks are very exceptional indeed, and I again repeat that truly scientific men would explore and observe the circumstances under which such exceptional rocks exist, and not ignore the rule that rocks and rocky sites are free from malarious fevers. As for every non-malarious marsh there are millions that are malarious, so for every rock which is malarious, there are millions which are perfectly free from fevers. It is admitted that rocks do decompose and disintegrate, they often have moisture confined in their clefts and crevices and organic matter may be washed down to them from higher ranges or wafted by the breeze from the neighbouring country. There are various possibilities which it is needless to conjecture. These very exceptional sites have as a rule been spoken of by unscientific travellers who do not enter into details, and merely give their broad impressions which are utterly-unsafe as supporters of a scientific theory and too weak to demolish one, established on a tolerably secure foundation, and inspite of such powerful blasts, as are from time to time blown by Dr. Oldham and his supporters, has stood for ages. I was once summoned to see a brother Medical Officer at Dhubri, the New Civil Station of the Goalpara District in Assam. It is a curious spot, a block of rock jutting out into the wide expanse formed out by the liberated waters of the Brahmaputra just as it emerges from its rock bound course through the Assam Valley. On the side of its connection with the alluvial country there is a large piece of low ground which is innundated every time the river rises, and on enquiry I found that the inmates of the two or three houses adjoining this ground, though built on solid rock, suffer from fever, while people living on the river-banks, though exposed to the chilly wind, enjoy perfect immunity from any disease of a malarious nature. Now if I were a blind partisan of the chill theory of malaria, and the existence of the marshy ground had escaped my notice, or if I were an unprofessional traveller, and my attention was drawn to the very few cases of ague in the place, I would have perhaps published the fact that fever of a malarious character was prevalent on rocky soil and would have unwittingly given a handle to the supporters of the chill theory of malaria. Who can say that the malarious rocks brought into requisition by Dr. Oldham are not instances of this kind? Such things, I mean the true explanation of these exceptional sites, can only be decided by a body of unbiassed scientific men thoroughly exploring the spot and its neighbourhood.

I shall now see if the theory Dr. Moore upholds cannot be demolished by his own statements. He says sudden vicissitudes of temperature acting on a debilitated frame cause ague. If that be so, why are two places equally humid, both situated in a hot climate, not equally aguish; nay, sometimes one is infested with fever while the other is healthy. And why does the same place once a sanitarium present a sad spectacle of disease and death. In this very district (Rungpore) I can point out spots where ague is comparatively rare. The terminus of the Northern Bengal Railway is on the right bank of the Teesta. On the opposite begins the K. & D. Railway. There is little or no fever among the employees stationed at the former although exposed to the prevailing wind passing over the river, whereas the servants employed on the latter line suffer a great deal from fever, and the climate of these two places scarcely a mile from each other, is precisely the same. Dr. Moore declares Zeimsseu's reasoning open to objection when that author in his Cyclopedia of Medicine says that "The theory of changes of temperature is abundantly disproved by facts. On the one hand those countries where the changes of temperature are most extreme, such as Scandinavia and the British Isles, are comparatively free from malaria; on the other hand those regions noted for an equable temperature are often the home of the most intense and pernicious forms of the disease." Dr. Moore disposes of this strong argument by bringing in the idea "Excitement and debility of the cutaneous system and that extreme liability to impressions from lowered temperature, which characterizes those residing in hot climates. A fall of a few degrees of temperature in the tropics" he says "will produce a greater impression on the human system than a fall of many more degrees in the temperate Zones, the inhabitants of which are also better protected by warmer clothing than in the tropics." If this be so, why was malarious fever prevalent in and near London a few hundred years ago. Dr. Tanner in his book on medicine says. "Two hundred years ago, when the soil round London was neither drained nor cultivated, and when the marshes of Cambridgeshire and Lincolnshire were covered during some months of every year by immense crowds of cranes, ague was a most *fatal* disease in England." The underlining of the word "fatal" is my own. Has the temperature of England changed, and are people less likely to be chilled now in the notoriously variable climate of that country than in days of yore when ague was prevalent there? In no country do old people so admonish one, if he exposes himself to the risk of a chill, but what they threaten one with, is not an attack of ague but a chest cold in the event of being chilled. Surely in the same country and in the same climate, the same cause did not produce one disease two hundred years ago, and produces a totally different one now. There must have been something removable which has been removed now.

Certainly not the variable climate. The inhabitants of England may be protected by warm clothing, but the street Arabs of London are not so protected. Still ague does not occur among those wretched beings, although the powerful predisposing causes, the deteriorated blood and lowered state of vitality brought about by insufficiency of food and clothing, crowding in unventilated dwellings and other insanitary conditions" are there. The Bengalees are certainly ill-fed, but Dr. Moore must have been drawing copiously on his imagination when writing, "one scanty meal a day of rice with a few tolahs of vegetables and a little mustard oil is not sufficient for the support of the ordinary physiological functions of the body, much less for the support of mechanical labour." The middle classes put into requisition a very considerable quantity of fish and milk; and no Bengalee however poor goes without two heavy meals a day. Hindoo widows live on one meal only, and are strictly prohibited from eating fish; but they do not suffer any more from fever, than their more fortunate sisters who have their husbands and are allowed anything they choose to eat. Dr. Moore talks of the variations of temperature an Indian peasant is exposed to. But in Bengal an European spending the hottest part of the day under a *punkha* and being deliciously cooled by the fragrant breeze passing through wet *khushkhus tatees* gets malarious fever sometimes in its worst forms. On the other hand the firemen and engineers in ships who come out of the hot engine room to be cooled on deck and are thus subjected to great variations of temperature, are not known to be liable to ague. Dr. Moore, quoting from Sir Richard Temple's Administration Report of Bengal for 1875, that, "After afflicting or desolating large tracts of country for ten years, it seems to have worn itself out, but it has left us after much scientific and professional enquiry still ignorant of its causes" remarks that "it may be confidently expected that so long as sickness is obstinately attributed to a hypothetical malaria we shall remain so ignorant." The sarcasm sounds very well; but as a scientific man Dr. Moore should have explained how any "recognizable climatic influence" explains the fact. Surely if there were any peculiarity in the meteorological condition of the atmosphere during the ten years the fever was raging, it would have been recognized by the scientific observers employed in the enquiry. No enquiry could have been complete without taking note of the atmospheric phenomena, and the chill theory was not unknown to the investigating officers; yet none of the many able observers employed ascribed the epidemic to any sudden change in the meteorological conditions of the affected districts. Perhaps Dr. Moore will attribute their inability to do so to "the vitality of teaching implanted in the mind during the *in statu pupillari*" period of life.

Dr. Moore, alluding to the disease which prevailed among the men in the force employed in the war on the gold coast Protectorate says, "we certainly do not require malarial poisoning to account for the origin and prevalence of sickness in this unfortunate force. Overcrowding, wet clothing and bedding, damp rooms, exposure to the sun, subjection to rapid and great changes of temperature, indifferent diet and drink, will produce disease in any part of the world, and specially so in the tropics, where both the skin and internal organs of the European particularly are in an excitable and debilitated condition. The character of the maladies arising may differ in some degree,—in cold countries chest complaints and typhoid, in hot climates abdominal complaints and remittents; but there is the absolute certainty that sickness will arise under such circumstances *whether malaria be present or absent.*" Surely this excitable and debilitated condition of the skin and internal organs seems much more hypothetical than the assumption of a specific poison for each disease in accounting for the fact that the same insanitary conditions give rise to different diseases in different places, nay even at different times in the same place. Is it not more consonant with reason to suppose that the neglect of hygienic rules so vitiates and debilitates the human frame that it becomes an easy prey to the germs of whatever disease may happen to be present, than to make it purely a case of heat *vs.* cold. Overcrowding, bad food, fatigue, &c., have been known to produce cholera, relapsing fever, nay even small pox, a disease clearly traceable to a specific germ,—irrespective of the climate of their occurrence. It is a well-known fact that a student working hard for his examination, going through a great deal of night work without sufficient exercise in the fresh air is more likely to suffer from the effects of a dissection wound than one who spends a great deal of his time at cricket or foot-ball, and does not work much at night. In such a case without the septic virus, no amount of study in a confined room will cause the specific malady. The insanitary conditions detailed by Dr. Moore gave rise to dysentery and remittent fever in the force at the Gold Coast because the germs of those diseases were present there. Similar neglect of hygienic rules will perhaps produce ague in the Roman Campagna and would have had the same result in the fens of England before they were drained and cultivated. But now the worst of insanitary conditions will not give rise to ague in London. No Medical man of any education ignores the potency of over-crowding, bad food, &c., in the production of sickness; but the most superficial observer will not fail to recognize the fact that they are not the immediate cause of specific disease. It is too late in the day of scientific enquiry to ignore the specific nature of fevers. Extreme grief, a sudden mental shock or a head Cold may cause a feverish state of the system, but it is very different from a case of remittent or intermittent presenting certain definite phenomena, the same as small pox typhoid or typhus, and curable only by certain medicinal substances which are also powerful germicides. The profession has not waited for the germs which give rise to pus to be discovered and demonstrated in the atmosphere, before taking advantage of the principles of Listerism; but one has only to walk through the Hospitals of the civilized world to appreciate the amount of good, the recognition of the principle has conferred on suffering humanity. Before the days of Listerism we all know pyemia and hospital gangrene used to be common diseases after surgical operations specially in overcrowded and ill-ventilated wards, and by giving a large space to each patient, carefully ventilating the ward, giving nourishing food and keeping up an equable temperature, we reduced those bugbears of operative surgery to a minimum. With Listerism carefully carried out the germs of pus are so effectually shut out from a wound that the occurence of pyemia is an impossibility. The *bacillus malariæ* discovered and demonstrated by some of the Roman physicians may not be the germ which produces intermittents and remittents, still that discovery though not verified and confirmed by physicians in other countries, coupled with the specific nature of the fevers and their treatment, ought to make us hesitate before we give up the old theory of malaria, because it is old and orthodox. No one, not even the staunchest advocate of the malarial theory denies the importance of chills in the production of ague; but a chill is no more necessary for giving rise to the fever than an ill-ventilated room is, for producing pus after an operation. Guard yourselves from chills and you reduce the chances of fever to a minimum, but no amount of flannel will give you an immunity from the disease if you reside in an aguish place. In 1874 I took Dr. Coates, then Sanitary Commissioner, round examining people with a view to show what a large proportion of the population here have chronic enlargement of the spleen. I was then somewhat impressed with Dr.

Oldham's views having just read his work and having had only a limited experience of my own. While crossing a river Dr. Coates pointed out to me the strong physique and the healthy appearance of the ferrymen in such peculiar contrast with the condition of the men we had examined before. His remarks made an impression on me. I have since examined the ferrymen in this district whenever I have crossed a river, and have carefully recorded the result. On looking at my notes I find that I have examined 67 such men and only three among them had enlarged spleen, whereas take any 60 men in this district congregated at a market place and 20 out of them are sure to be splenic. There can be no doubt that the men employed on the ferries are most exposed to chills. The sand in these rivers is extensive, and the men are exposed to the heat reflected from the heated sand during the day and the nights become intensely cold. The poor men often sleep on the open platform of the ferry with the protection of a flimsy *chudder*. Does it not show that although exposed to the chills they are not exposed to *something* which does not exist on these rivers but exists on land? If Dr. Moore's theory is to be accepted, then so long as the temperature remains variable in a hot climate, there is no hope of eradicating the disease, and as a variable temperature is not within the control of man, we must "grin and bear". A gloomy idea indeed. But is Nature so unkind? No! We have ample proof now in all the civilized parts of the globe of the fact that by the reclamation of marshes and the removal of ground moisture from damp places fever has been abolished. Professor Tomasi-Crudeli's article entitled "Malaria and the ancient drainage of the Roman hills" in the Practitioner of October 1881, tells in graphic language what is malaria and how to get rid of it. It deals in no imaginery theory, but gives us details of facts in which every one of us in India ought to be deeply interested. It is still within living memory that in and around the fens of England ague and ague-cake were prevalent, and records are available which show that malarious fevers were prevalent where Russel Square in London smiles in healthful splendour now. If the feverish marshes in England could have been changed into a smiling and healthful country it would be idle to sit and listen to Scholastic theories of "climatic influences and irritability of the skin." I do not urge that the poison theory is indisputable. But now that we have seen that the removal of ground moisture has been followed by the abolition of the disease from certain localities, we as the sanitary advisers of the public should counsel them to drain the country instead of cavilling among ourselves about the agent which causes so much avoidable suffering. We have at least found the conditions under which the thief dwells unseen. The effective way of securing ourselves against his stealthy attacks is by rendering his dwelling unfit for his habitation and thus starving him out and not by wrapping ourselves up in flannels and blankets and living in constant terror of him as the supporters of the chill theory would advise us to do.

A DIFFICULT PROBLEM SOLVED:

SHEWING WHAT SANITATION IS, THE EVILS ARISING FROM A WANT OF IT, AND THE MEANS NECESSARY TO REMOVE THEM;

WITH

REMARKS ON URBAN IMPROVEMENTS—MORAL, SOCIAL AND PHYSICAL.

By W. BURROUGHS,
A RETIRED SERVANT OF GOVERNMENT,
AND
AUTHOR OF "EXPERIENCES OF AN OFFICIAL." "CURE FOR THE CRISIS."
"THOUGHTS ON HOUSE AND LAND IMPROVEMENT." "A FEW REMARKS
ON SOME IMPORTANT POINTS CONDUCIVE OF PUBLIC GOOD."
"HOMESTEADS FOR THE NATIVE POOR." ETC., ETC.

> Problems there are in science, in morals, in theology, as on other subjects, which puzzle philosophers.—F. P. COBBE.

Cessante causâ cessat et effectus.

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1886.

DEDICATION

HONORABLE SIR AUGUSTUS RIVERS THOMPSON, K.C.S.I., C.I.E.

Lieutenant-Governor of Bengal.

&c., &c.

10 AUG. 98.

HON'BLE SIR,

IN dedicating this pamphlet to your Honor, I have a few words to offer. I do so because your Honer as a wise ruler, has evinced a warm interest in the well-being of the city.

The following remarks of your Honor, delivered at the inaugural meeting of the Public Health Society, are too clear to be questioned, that, "co-operation and not hostility, sympathy and not opposition should be used in a contest against disease and death, in which all, whether natives or Europeans, whether poor or rich, are equally and intimately concerned."

Should, for the crying evils, the remedies here suggested meet your Honor's approval, thousands will be made happy; since to breathe freely without fear, or to live comfortably without mishap, cannot but be a blessing.

Regarding my proposals, based as they are on indisputable feasibilities, I anticipate public support; should your Honor also extend yours, the matter mooted will soon become an accomplished fact.

CALCUTTA,
60, Macleod Street,
Park Street—East.
15th November, 1886.

I am, with due respect,
Your Honor's most obedient Servant,
W. BURROUGHS.

PREFACE.

In consequence of having written a good deal on the *Bustee* question as sanitary improvements, that, several kind-hearted gentlemen who take no little interest on the subject, asked me to deliver a lecture, and I consented to do so; but while making notes for the purpose, I found so much creeping up, that, I could not well compress them into a nut-shell, therefore was obliged to change my course. Jottings would certainly do well in a short discourse, but in what relates to health, something more than a mere outline was desirable; hence the cause of publishing my views at my own expense in the form as now offered, so that they may be read with ease, and if acceptable, may be adopted with advantage.

Rate-payers by virtue of their right, possess a status to urge the necessity of such measures as may prove useful for the present as for the future, but in case of non-compliance on the part of the Municipality their remedy is simple—it is not "to swear and suffer," but humbly to represent matters as they stand to Government; and steps, no doubt, will be taken to improve a state of things abounding as said "more in complaints than in comfort."

In my "Experiences of an Official," published in 1855, and dedicated to Lord Canning, I had therein offered a few suggestions, which notwithstanding the commotion that soon after followed in the outbreak, for their aptness, except two points, were adopted, and they did much good. Those here suggested if adopted, will also do much good. The facts adduced in regard to them, as may be seen are self-evident, hence the reasonableness of the allegation. The two points adverted to, as passed over, one is just awakening attention; the other though dormant, will, it is believed, erelong be noticed.

In conclusion, I wish it to be clearly understood, that, in what I have here adduced, I have done so with the best of motives—public good, and blame no one for short-comings, but the system which retards progress. Every one apparently, is doing his best to give satisfaction and yet cannot give, as it should be given, because of the reason as assigned by Swift, that, "a cripple on the right road will sooner reach the distant post than a racer on the wrong."

SANITATION.

> "Health is the one thing needful. No pains, expense, or self den
> can bear for the sake of it, is too much for it. Whether it requires us to
> lucrative appointments, abstain from favorite pursuits, or undergo str
> mens; in fact, whatever difficulties it lays us under, as rational beings,
> seek it, we must submit to it."

A time as this, may well be compared to Cobden's time, when "a great wave of humanity, of benevolence, of desire for improvement, poured itself among all who had the faculty of large and disinterested thinking."[1] If such a time has really arrived here, as it appears it has by the agitation observable around us; then it is our duty to look into it, aye to take advantage of it, lest the opportunity so afforded might be lost—perhaps for ever.

Speaking of Sanitation, a recent writer[2] has also remarked, that, a "revival" has taken place in the city; the truthfulness of which cannot be questioned; since a good deal of late has been said on the subject, which years before were never thought of, much less dwelt upon,[3] although occasionally something used to be heard about it, but like the echo of a distant thunder it soon died away, while

"Viewless—soundless—stalks the spectre
Thro' the city chill and pale—"

Notwithstanding much that has been said of evils—moral, social and physical around us, yet as far as has been seen; no feasibilities have been pointed out to meet them; hence the endeavour made here is to throw some light on points still lying unnoticed with the view of awakening attention to a danger which by care may be remedied—peradventure removed.

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[1] Morley's Life of Richard Cobden.

[2] "Air, Water, and Soil, as affecting health," by W. J. Simmons, Esq.

[3] The Sanitation-lectures in the "Journal of the Health Society" for 1885, are the work of persons who had studied the matter with care and delivered their views with a precision that cannot be questioned. For their cheapness as usefulness, they are strongly commended to notice of those who value not only their own health but also the health of those around them. The set can be had for a rupee at the Public Health Society's Office, 6, Hastings Street, Calcutta.

d yet precise; the subject-matter of this paper ged under the following headings, *viz* :—

hat is meant by Sanitation.
Evils arising from a want of it.
III. Remedies suggested whereby they may be removed.
IV. Evils—Moral, Social and Physical.
V. Urban improvements.
VI. Concluding remarks.

I.—WHAT IS MEANT BY SANITATION.

SANITATION is that branch of knowledge which teaches us to keep land free of diseases arising principally from two causes—Stagnation and Decomposition. The former is putrid liquid matter, the latter is putrid solid matter. Not the solid, which is characterised by firmness or hardness, but that which is "easily separable," being soft and sluggish, but not watery.

In all civilised countries, Sanitation is deemed to be a subject of the utmost importance, and for good reason, because it ensures health, consequently happiness; hence any amount of labour bestowed to obtain it, or money laid out to secure it, can never be considered too much. In fact it is an essential, regarding which there should be no two opinions.

II.—EVILS ARISING FROM A WANT OF SANITATION.

IN low countries as in hot climates, the fear of sickness caused by miasmatic vapour, is much greater than in cold regions or on elevated situations, because decomposition does not take place there quickly, nor water-lodgment formed easily; whereas such is not the case in countries differently situated, as for instance Bengal is; particularly its lower provinces, which being flat, water lodges easily and organic matter accumulates quickly; these stagnating and putrifying, vitiate the atmosphere, and thus creating complaints, and not a few among them, of a serious character.

Sir James Clark, speaking on this subject, says :—"Persons living in low, damp, or confined situations, rarely enjoy that degree of vigorous health which their constitution admits, without suffering from some formal disease. They are subject to va which often embitter their life, and render them much of bodily and mental exertions than they would be, if p situation more congenial to their constitution. Dyspepsia, various concomitants, headaches, nervous debility, and a vari complaints, with languor and depression of spirits, may be enum ated as evils resulting from a residence in unhealthy situations.

"Trees and thick shrubbery close to houses are not only direct causes of impure humidity, but they act still more injuriously by impeding free circulation of air and the entrance of the sun's rays.[4] Many country-houses and indeed whole tracts of a country, are rendered unhealthy by the quantity of wood alone. Were trees around houses, and wood of all kinds, especially thick underwood, kept more distant, and rank grass, stagnant water, and other obvious sources of impure humidity removed, and were more care taken to drain the surface soil, a marked improvement would be effected in the health of the inhabitants generally, and more especially in thickly wooded and marshy districts."[5]

Dr. Charles Searle in his valuable work on "Cholera" says:— "Sporadic, and locally engendered causes of this disease, or one precisely in character with the epidemic in all its leading features, though in general less in degree of severity, have, however, always been of frequent occurrence in hot countries, during the autumnal months; from the combined effects of debility of the system and derangement of the biliary and associated organs, which so generally ensue from the preceding hot weather, and malaria, which at that season, is so much more abundantly developed by the agency of heat, and issues from drains, sewers, or wherever animal or vegetable substances exist in process of decay; its effects being, however, more particularly manifested in damp, filthy, low or confined situations; the individual in the condition of pre-disposition to disease, being exposed to its influence and inhaling such malaria, having his blood, it may be said, truly poisoned thereby.

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[4] This remark proves the correctness of an Italian proverb, which says :— "Where the sun never comes, the Doctor must."

[5] "The Sanative influence of climate; with an account of the best places of resort for invalids in England, the south of Europe, &c., by Sir James Clark, Bart.

ed hydrogen, one of the offensive gases, issuing
, and product of decomposition of animal and vegetable
, is so truly poisonous to the animal system, that, a bird,
small animal, exposed to an atmosphere containing but
ifteen-hundredth part of this gas, dies almost immediately
om its effect; and a horse has been killed by exposing it to breathe an atmosphere containing but one 250th part. That malaria, which is composed of this and some other gases equally noxious, developed by the decomposition of animal and vegetable substances. Wherever they exist, may truly be affirmed to be a poison, and which, under certain conditions of the atmosphere and state of the system, will produce cholera; and under other circumstances of exposure to its influence, will occasion typhus fever, dysentery, scarlet fever, erysipelas, rheumatic fever, influenza or other modification of fever of a remitting type with local affection either of the brain, lungs, or abdominal organs.

"We must not, however," continues Dr. Searle, "confine our ideas to the immediate or direct decomposition of such substances, or to the sources, I have mentioned exclusively; the exhalation from marshes, or paddy grounds, from jungle or forest, as well as from the uncleanly persons of both men and animals, or the deterioration of the air by respiration in crowded apartments, and imperfectly ventilated or confined situations, are quite equal in certain conditions of the system to produce the same effect, *viz*, cholera, or as I have before said, under other circumstances, typhus or remittent fever."[6]

Dr. Norman Chevers[7] says:—"Wherever there is an ill savour, there must be something putrid not far off[8]; and it does not require a much more educated faculty of observation to enable the sanitarian to notice, that, wherever there are marshes; intermittent and remittent fevers, spleen, liver complaints and dysentery abound."

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[6] Dr. Charles Searle, on "Cholera, Dysentery and Fever."

[7] "The sanitary position and obligations of the inhabitants of Calcutta." A lecture delivered before the Bethune Society, 13th November, 1862.

[8] This is obvious from the circumstance, that, the noxious smell a pigery, tannery, or filth depôt emits is scented long before the actual spot where it stands, is reached. This clearly shews to what extent the air around, is contaminated by the nuisance.

Again! "Wherever there are over-crowded dwellings, open sewers, sewers of contaminated water and filthy streets; cholera and typhoid outbreaks are most destructive there, and all the diseases of the climate gain tenfold virulence and deadliness."

Drs. J. R. Martin and J. Vos, were also of the same opinion, as many other eminent medical men who had seen the country and its conditions and recorded their views accordingly.

What has here been shewn, bears a reference principally to the suburbs, but that ought not to make us unmindful of the evil because it is distant. The wind, which cannot be shut out, brings it near—brings it home, hence the fear in regard to it cannot but be considerable; and bad as this is, it is worse still, when we find that, it is at our doors and comes in through our windows,—*viz.*, the Bustee-poison.

Dr. W. B. O'Shaugnessy, speaking on the subject of air-poison, says:—"Chemistry has long since pointed out, that, the air we breathe is not, as the ancients thought, and as the uneducated still believe, an elimentary or simple substance, but is composed of *Oxygen* and *Nitrogen* gases, with small quantities of an air called *Carbonic Acid,* and it has further proved the extraordinary fact, that, it is the *Oxygen* alone which supports our breathing, and thus maintains our lives. The *Nitrogen* lends no assistance to the function, but most strange of all, the *Carbonic Acid,* which exists in the air we are every moment respiring, is a poison of such power, that, if it were present in the proportion of but one to four parts of the air, every animal of the higher classes would instantaneously perish. By various natural and artificial processes this poison is produced abundantly on the surface of the globe. In many places it accumulates rapidly to the imminent danger of those who approach it incautiously."[9]

M. K. Bayer in Henke's Journal of State Medicine for 1832, assigns as the cause of Cholera "a miasm, which, having combined with the water of tardy flowing rivers and pools is again liberated during the evaporation of these waters and so mixed with the atmosphere, which being thus contaminated, becomes the principal pestiferous agent."

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[9] "Manual of Chemistry."

Of all poisons, air poison is most to be dreaded, as it cannot be guarded against, and inhaling which, is injurious to health. Being composed of infecting particles floating in the air, occasioned by organic decomposition or liquid stagnation, it comes in freely to do its work—causing disease—not unfrequently death.

III.—REMEDIES SUGGESTED WHEREBY EVILS MAY BE REMOVED.

"THE PLAGUE IN OUR MIDST."

BUSTEE POISON.

THE improvement of the city is an important subject, and as it is desirable to keep it clean consequently healthy, we shall therefore shew how the needful may be done by good measure, rather than by the waste of good money.[10]

A great evil in the city, since the poor cannot be turned out of it; are the *Bustees*.[11] If they are however improved, not a little will be gained in furtherance of a great object—Health. But to carry out the improvement; two things are absolutely necessary—local law and strict supervision, without which the hope of success will be distant.

The *Bustees* in the city are so awkwardly constructed in angles and projections, that, conservancy carts to remove sweepings, cannot ply therein with ease, and in case of fire breaking out (as it is often the case) the Fire Engines cannot work with effect;[12] while unoccupied spaces in them, are appropriated by the inhabitants to throw all kinds of refuse, which rot and remain there. For plastering mat walls, also for raising hut-floor, earth is excavated, and the hollows so formed, are left unfilled to be filled up during the rains, which afterwards stagnate, and thus two fearful agents—putrid matter and putrid water cause an obnoxious exhalation—air-poison, the effect of which is injurious to all alike—the rich and the poor.[13]

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[10] *Indian Daily News*, July 22nd, 1886.

[11] This word *bustee*, means a settlement. Being groups of huts erected without regard to arrangement, in open spaces in the city for native habitation. They are invariably near, often between European dwelling houses; hence the fear, owing to causes, as shewn.

[12] As was the case in the early part of the year. The whole of the *Táti Bágán* bustee, was burnt down; and though the Fire Engines were present but could not work with effect, owing to the awkwardness of its construction.

According to an article which appeared in the *Asiatic Quarterly Review* and noticed by the *Tribune*[14] touching "Village Sanitation"[15] under a prescribed rule, the subject as said, was ignored by the Bombay Government, not from any disregard to it, but from a kind feeling, that, in pressing the question, the poor would suffer in constructing dwellings in conformity to "Sanitary science." But as this is a mistake, arising probably from mis-information, we shall therefore endeavour to point out the feasibility.

There are two ways of doing a thing—the right way and the wrong way. From ignorance, often from habit and custom, the poor class of natives have followed the traditions of their fathers not only in the construction of their houses, but in every thing else.[16] That law which the ancients had as Ælian says,[17] to improve things, they never had, yet to their credit it must be said, that, when their eyes are opened, and they see the good, they appreciate it, and are the first to complain "if they think it is neglected."

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[13] The following is another proof shewing, that, offensive smells cause dangerous complaints :—

According to the Telegram of 7th September last, under the heading "Burmah News." These words occur. "Waters subsiding, but several roads at Mandalay are still under water. The stench from dead bodies drowned and animals are great, Cholera has broken out."

[14] Of May 15th, 1886.

[15] By W. G. Pedder, Esq., Bombay Civil Service.

[16] Mr. Pedder's remarks are so very apt on the subject of habit and custom, that, they cannot well be withheld. "A woman" he observes, "will draw water from a polluted tank, and letting it stand for a few hours till the mud has settled to the bottom of the jar, will say, that, it is sweeter and softer than the water of a pure well; her ancestors always drank it, and why should not she; finding it difficult to conceive, that, water which is nice to the taste may contain the invisible germs of disease.

"The *ryots* also," he continues, "cannot easily realise, that, a thing which has been in the middle of the village for generations can be unhealthy, that the filth of cattle is dangerous near a house where they have always stood, or that the air of the village is contaminated by the stench of odour or of rotting refuse near it but out of sight. Their notion of Sanitation is to deposit offensive matter in some corner where it is not seen. Nevertheless, I believe, what, all the people generally want, is, teaching on such points as these. My own experience—which is not inconsiderable in Municipal affairs—is, that where effective Sanitation has once been introduced, the people soon begin to appreciate its benefits, and are the first to complain if they think, it is being neglected."

[17] Lib : IV. Cap 4.

From our knowledge of the subject, we see no extra expense in the matter whatever. In the construction of homesteads people should be told to build them in squares with roads between and openness around. The building ground also should be made sloping so as to allow water a free run and pits to carry it off. Thus the place would be kept clean and dry, and the charge for doing so, *i. e.*, in the right way, would not be any more than doing the same thing in the wrong way.

To clear this point further; an instance might be adduced. Supposing a person was to build a house facing north or south; the cost for doing so in either way, would be the same. If so! Why not build it facing the south to enjoy the summer breeze, than the north, to be chilled by the winter blast. The error as will be seen, is in the idea, arising from a mistaken notion, and not in the charge of construction; since the outlay in either case is the same; but the difference is in the action, instead of doing a thing with the same money in the right way, it is done with the same money, in the wrong way.

In regard to ordinary brick-built houses, there is a law here, that, the foundation should be six feet deep. This is to ensure stability; but to larger buildings the foundation accorded is proportionately deeper and wider. A law similar to this is also desirable in regard to *bustees,* not as to their foundation, but as to their construction; which being carried out under proper superintendence, it would prove good in every way—health, comfort convenience, and surroundings. While the fear of the atmosphere being tainted with unwholesome vapour arising from them, would of itself abate. "The cause removed, the effect must cease."

HAVING given a clear idea of evils which abound in the suburbs as in the city; as the air-poison they insidiously disseminate, we shall now dwell for a while on another medium; owing to which we often suffer severely—the evil introduced by our servants.

Because of cheapness, a large number of our domestic servants live in the suburbs, and out of which number who daily come to the city; if only ten bring with them either in their person or in their garment some infectious disease and communicate it to their employers, and they in their turn to their friends and relatives; why in no time, hundreds of families in the face of all care and caution, would be stricken with complaints which cannot but be dreaded and against which there is no help—being imposed by those who occupy the Capri of Calcutta with its lake Avernus around it.[18]

Eminent persons—persons living in palatial buildings with comfort and cleanliness around them, are often suddenly struck down. And why so? It is not owing to dirt and damp, pools or ponds, or the like in their localities. Then to what? The answer is—to contagion-contact brought from abroad to do its work at home.[19]

On this subject, the remarks of an able writer are so apt, that, we cannot help citing him in support of our statement.

"The suburbs in their present condition" says Mr. R. A. Sterndale,[20] "are a standing menace to the health and prosperity of the city, because the interests of the town and suburbs are identical; the one cannot prosper without the other, every insanitary condition of the suburbs re-acts on the town, every suburban outbreak of epidemic disease is an immediate danger to the town people. Every breeze that blows over it; every current of air which enters it from the north, east, and south passes over the suburbs and receives and bears upon its wings, either life giving ozone or death dealing miasma.[21] Thus—though the salt marshes, the low swampy lands, the foul ponds, the seething filth which surround them are hidden from their sight—whether they live in Chowringhee palaces or the more humble tenements of Creek Row, or the close-crowded quarters of Bárá Bazár, they are still exposed to use the words of Caliban, the ill-natured son of Sycorax—'to all the infection that the sun sucks up from bogs, fens, flats, as wicked dew as ere my mother brushed with raven's feather from unwholesome fen.' "

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[18] *The British Medical Journal* says:—"A case is related in a German Journal, that, a veterinary surgeon, two days after declaring a locality to be infected with the foot and mouth disease, having to travel in a violent east wind, employed a handkerchief to protect his mouth which he had in use while examining the beasts. The next day he was seized with a violent headache and pains in the limbs. On the second day there was fever and a feeling of irritation in the hands and feet. The third day the fever abated, but there appeared on the tongue, lips, mouth, and edge of the nose, an eruption of an aphthous character, which lasted eight days."

Among numberless instances of the kind—contagious communications; the above clearly shews how the virus of the disease adhering to the handkerchief affected by inhalation, the system.

[19] Hon'ble Mr. Colvin, Lieutenant-Governor, died of Cholera, while Lord Hobart, Governor of Madras and Lady Canning, of poisonous inhalation.

[20] Author of "The suburbs of Calcutta: Their past, present and future relationship to the Town."

[21] It is notorious, that, foul air is the cause of Zymotic fevers.

IV.—Evils moral and social.

Houses of ill-fame.

" Enter not into the path of the wicked, and go not in the way of evil men. Avoid it, pass not by it, turn from it and pass away. For they sleep not, except they have done mischief; and their sleep is taken away, unless they cause some to fall." Prov : IV. 14-16.

At the "Social Purity Meeting," held in the Town Hall on the 3rd August last, some apt remarks were offered, but that which was urged by Dr. K. Macleod, in a physical point of view, was certainly important, inasmuch as said, it causes not only a loathsome disease; but being transmittible from father to son, becomes heriditary—doing harm to a whole generation; hence to abate it, Government interference becomes necessary on two grounds—one on the score of humanity; since those so stricken, cannot be cast away—next, as to expense, since they must be taken care of and provided for, which entails not a little.[22]

If the exhibition or sale of obscene pictures be punishable by law, why should not those be equally so, who may well be termed obscene living pictures. Common sense tells, that, a living snake is more to be feared than a dead one.

Again! If an offensive trade, such as hide tanning, fish curing and the like, is not permitted in the Town, why should an immoral calling be permitted—a calling which as much corrupts the mind as it does the body; hence for questionable females distinct quarters seem desirable, so that they may not occupy as they now do houses in public streets which are frequented by persons of all classes who are shocked at what they see and hear.

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[22] Were a calculation made as to a patient's expense in an Hospital for medicine, food and attendance, it would shew a pretty large figure.

Not unfrequently children in their morning or evening walks; or when going to or returning from schools; see and hear nothing good; and as early impressions are seldom effaced, hence they should be prevented from imbibing them.

The excellent remarks of Rev. Dr. Farrar made in March last, at the Polytechnic Young Men's Christian Institution, Regent Street, London, on early training, demand serious attention, as therein not a little is shewn to warn parents against a neglect, which ultimately may terminate as it has often terminated,—sadly. By bad example to the young in "immoral streets."[23] .

Mr. Besant, also says, that, while spending a few days at Hampstead-heath; he was "shocked at the language used by girls of from thirteen to seventeen." And where did they pick them up? Surely not in schools! No! But in contact with questionable people who "tempt others to imitate their crimes and lead the unwary to their ruin."[24]

"It is essential to the well-being of Society" says Professor Thorold Rogers in his "Callings, forbidden and controlled," that, there should be no open violation of public decency. If, therefore, any person were to inculcate by word or deed any practice which plainly outrages public morality which is felt to be essential to the well-being of mankind, it is and will be the duty of the State to forbid such incentives to ill-practices and to punish wrong doers.

"Acts which lead with peculiar readiness to mischievous practices, or may lead themselves to temptation and vice, are wholly forbidden; sometimes they are brought under strict police."

Viewing however the question on a broad basis, it must be admitted, that, no persons should be prevented from plying their vocation, be what it may—good or bad; but on the other hand, it will not be denied, that, for a questionable calling, fit places should be allotted. If shambles are not permitted every where, why should brothels be, which morally viewing, are a great deal more dangerous.[25] Institutions whose object is to impart sound knowledge, could not do better than to make a move in a matter as this and so very important.

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[23] For details, *Vide Indian Daily News.* April 13th, 1886.

[24] In the *Indian Daily News* of July 19th 1886, there is a mention made, shewing how artfully a gentleman was decoyed to a house of ill fame on pretence of reading a French letter. If so! How much more easy would it not be to take in, in a similar manner, a young man or a young woman.

On this subject, arising, from a sad occurrence, there was a talk sometime back, that, an application was to be made to Government to have certain questionable females removed from the vicinity of a public school.[26] The reason being, that, one Tincori Pal, a native student, was wiled away by one of them, and who on playing false, was murdered by him, for which rash act, he was tried, convicted and executed on the 13th August 1885. Here then is an instance, shewing, that, a bad sight first diverted him from a good course and ultimately led him to a fatal end. Truly.

"Vice is a monster of so frightful mien,
As to be hated needs but to be seen ;
Yet seen too oft, familiar with her face,
We first endure, then pity, then embrace."

In this matter segregation as suggested ; is certainly good, inasmuch it is a relief but not a removal. A poison should be removed and not reserved in some quarter to extend again its influence, 'till it leavens the whole meal.' But in saying so, let us not forget, that, human beings though fallen, are human beings still, therefore they cannot be cut down like obnoxious trees, but must be reclaimed in the same way as that kind-hearted lady, Mrs. Danvers had reclaimed John Sotheran, a confirmed drunkard, by being continually at him and about him, until a change for the better was introduced and better still followed.[27] And this great work was accomplished not by "maudlin sentimentalism, useless lamentations and unseemly personalities," but by shewing the erring, the error of his ways, and not by simply telling him as many do—"Depart in peace, be ye warmed and filled, notwithstanding ye give them not those things, which are needful to the body; what doth it profit?"[28]

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[25] According to the *Indian Purity Trumpet*, September 1886, the following is given as part of Her Majesty's Proclamation, dated 9th June, 1860.

"We do strictly command all Justices of the Peace, and all other our subjects whom it may concern, to be very strict in the prosecution and punishment of all persons who shall be guilty of immoral practices and to suppress all disorderly houses."

[26] It is not said, that, whether the proposed petition was submitted. Had it been, for its laudable object, the Government kind as it is, would have adopted some measure to remove a common evil for the common good.

[27] "John Sotheran's promise and how he kept it," is a beautiful tract (No. 1204, published by the Religious Tract Society.) It plainly shews what

On a subject as this, we cannot help giving vent to the warning voice of Bishop Temple, which it is hoped may act as a tocsin upon all parents and guardians, to induce them to take some step before it is too late.

"Among all the vices" says the learned prelate, "which it is necessary to subdue in order to build up the human character, there is none to be compared in strength or in virulence with that of impurity. It can outlive and kill a thousand virtues; it can corrupt the most generous heart; it can madden the soberest intellect; it can debase the loftiest imagination."[29]

LIQUOR SHOPS.

A newspaper correspondent once remarked, that, the authorities "should compel the owners of such shops to close them precisely at sun-set and on no account be allowed to keep a soul in them after the prescribed hour."[30] This is all very good as talk, but if the writer had any experience, he would have thought differently.

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perseverance can effect. It ought to be re-printed and circulated, so that while not a few on the one hand, will be encouraged to do good; on the other, not a few will be reclaimed and restored to the fold whence they had strayed. I once had a mind to re-print it, but if after this remark, it is not done by any Society here, I may do it yet.

[28] Were a "Home of Hope" established here as elsewhere, as Mrs. Dora Gladwin's is at Chinchpoogly, Bombay, hundreds of girls as fallen females would be saved from being lost, who often owing to want, evil example, or temptation, have been driven "to a bad life."

Since the above was written, I am glad to learn, that, a similar Society, styled "The Calcutta Women's Friendly Society" has been established here; its object being—"the reclamation of the fallen and the tempted." This certainly is kind and hope it may prosper. It may however be remarked, that, to deter people from evil, bad examples must be checked and temptations removed. Tares and wheat should not be allowed to grow promiscuously, as the strong influence of the former is sure to operate detrimentally upon the weakness of the latter.

[29] The *Sentinel*, No. 66, October 1884.

[30] *Indian Daily News*, May 22nd, 1886.

These shops are not closed at sun-set, but according to their license, at gun-fire, and yet almost all are kept open up to a late hour through their taps, which are small huts or godowns adjoining them, where spirits of all kinds are sold in the sly. Servants returning from their work late at night, resort to them for their quantum which they use in houses of ill-fame. Were however such subterfuges kept closed by strict watch, the chance of people getting drunk and disorderly would be an imposibility, and thus half the "night offences" as termed, prevented. It may be observed, that, the largest sales take place at night, hence the dodge resorted to, to evade the law on the one hand and make money on the other.

DISORDERLY CONDUCT.

Drunken people during the day as at night go about the streets singing and tom-toming, often fighting and abusing each other to the discomfort of quiet people. This evil also needs a remedy. To remove a man who is "drunk and incapable," so that he may not be run over by a passing vehicle; is certainly a kind act, but would it not be kinder to secure honest people, peace, which is disturbed at all times, by incessant jarring.

Sometime back it was reported,[31] that, a person was fined and very properly too, Rs. 25, for causing a nuisance to be committed in his house by allowing lewd songs to be sung and noisy music to be played to the inconvenience of his neighbours. An offence as this merited the punishment awarded; but how much more so it must be when a conduct as bad is allowed in public streets unchecked. In questionable quarters night patrolling would be more useful than day patrolling, to put down evils committed by sots and bullies after night-fall.

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[31] *Indian Daily News*, June 23rd, 1886.

This decision it is hoped, will remove a wrong notion which may entertain, that, one can do as he likes in his own house or ground. In the cause of public interest, one cannot do as he likes even in his own house or ground, if what he does, is offensive to his neighbours in sound or smell, or in any other way which may prove injurious to health or dangerous to preperty; as hide-tanning, fish curing, Kerosine oil storing, &c.

Touching a matter as this, the discipline of Aoste might well be introduced here. Speaking on the subject, Rev. Dr. G. B. Cheever, in his "Wanderings of a Pilgrim in the Shadows of Mont Blanc and the Jungfrau Alps;" says:—

"No loud singing is allowed in the streets nor any noises capable of disturbing good people who wish to sleep. Vagabonds are carried to watch houses and nothing but honest callings are permitted, and decent moral amusements for recreation."

CAUSE OF PILFERING AMONG DOMESTICS.

The inducement to theft among house servants (independently of the notion and not unfrequently a correct one, *viz,* the carelessness of masters in putting temptation in their way) arises principally from three causes:—

1*st*—BICKREEWALLAHS, who form a peculiar class and go about the streets, crying for old paper, empty bottles and so forth, but really are purchasers of stolen property: Were they however under an injunction to shew to the Police what they buy, the furtive propensity of servants would soon abate—perhaps cease altogether; as what they steal if they cannot sell, it would be useless to steal.[32]

2*nd*—Liquor being available at late hours, imparts an impetus to the habit of stealing, as with the proceeds so obtained, a desire so ardent, can easily be gratified.

3*rd*—Improper places scattered as they are all over the Town, also impart a great influence on people who are devoid of principle and who in such haunts, ill spend their ill got booty.

BEGGARS.

There are four kinds of beggars in Calcutta, *viz.* Unfortunate beggars, Singing beggars, Ulcerous beggars, and Boy-beggars.

Unfortunate beggars are those who are the victims of circumstances. Loss sustained in trade, or by storm, inundation, or protracted illness or having been crippled by some accident, are therefore unable to work. These certainly should be pitied and provided for; since as Moore says—'no one is certain of his situation. What he may now view with indifference, might one day by a sudden change, be his own to deplore,' and regarding whom there are no exceptions even in higher life. Burke's picture[33] is a tacit proof, more need not be said.

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[32] As there is a law in England in regard to Pawn-brokers, so there should be one here in regard to Bickreewallahs A measure as this has proved effectual elsewhere and so it would prove here if acted upon, "not because it convicts an offender, but because it prevents an offence;" since it is an admitted fact, that purchasers or receivers of stolen property, encourage theft.

Singing beggars are hail and hardy men with good lungs to scream and strong legs to go from door to door over the Town. These should be made to work and not be allowed to live by imposition. They are not much unlike the Mexican vagabonds, who "will only work if labour be short, and the pay immediate, and are ready instruments for any crime."[34]

From a disinclination to labour, arising from a morbid habit, which unfortunately is much encouraged under a mistaken notion—alms-giving; beggary of late, is become a profession. The following from the *Darjeeling News* of 26th June last, is an illustration, shewing how advantage is taken of it wherever there is a possibility for it:—

"A few years ago, Darjeeling was an undiscovered land to the professional beggar, beyond a dancing Lama was to be met with. Now, however, whole beggars, blind beggars, lame beggars, and all sorts of beggars come, like people more blessed to spend the summer on the hills, and are to be found all over the place, but specially in the bazar, howling for alms. They are increasing in number year by year; and as they are growing a nuisance, the Police should, we think, help them back to their homes, with a gentle hint not to return again."

As a class, this body of men is almost everywhere considered and not unreasonably a nuisance because of their arrogance and importunities. The Author of "The Island Empire, or scenes of the first exile of the Emperor Napoleon I," speaking of Porto Ferrajo, says—"Though monotonous, possesses one advantage over every other town of Italy,—the absence of beggars." Capt. Burton also in his "ride in the Holy Land," complains of "bull beggars and of beggarly curios." This certainly is bad! But what he would have said were he in that "wilderness of monkeys" as mendicants—Benares, where the arrogance of the *Joghies*[35] is beyond endurance, and yet Hindus under an impression, that, abuses of so-considered sanctified men "are blessings in disguise;" give them largely in charity; and particularly more so in their sacred places. Allahabad or the "Plain of Almsgiving" as called, is one, and it is considered so holy, that, according to Jules Verne,[36] M. Rousselet, quoting a passage from the 'Life of Hionen Thsang' says—"It is more meritorious to give away one pice of money in this place, than a hundred thousand elsewhere."

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[33] "Vicissitudes of Families."

[34] "Mexico: The country, history and people." Printed by the London Religious Tract Society, 1863.

Following the profitable calling of this class, it is probable, that, at a later period arose the Moslem mendicants, who pride themselves in being called as already observed, hereditary beggars; were they however made acquainted with the ruling of the highest authority, that, man 'in the sweat of his face shall eat bread' and thus be made to work, the spell would soon be broken and they cease to be what they are now—a nuisance.

Often we read in Newspapers, that, the so-called-beggars are rather rich than otherwise,[37] as not unfrequently large sums of money have been found on their persons as in their houses, either concealed in some old earthen pot, sewed up in some dirty quilt, or buried in some dark corner. They also often resort particularly the old ones, to a clever dodge, in calling generally on sunday morning at gentlemen's gate with a posse of children, said to be orphans, or their grand children, and so forth. They are from the *bustees*, hired out by their parents on an understanding of getting a portion of the gain so made. Eventually by a process as this, a habit is imbibed, and when they grow up become professional beggars, and thus like "early birds," they make an early gain to riot on it the whole day, "and when the morning calls again to toil, they begin anew their journey and their life."

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[35] The *Joghies* of the present day, are believed to be the descendants of the gymnosophists or naked philosophers of the Greeks who came to India at the invasion of Alexander the Great. It is a misnomer to call them "a sect of Indian philosophers" if any signs however of philosophers are to be traced in them, those of Pythagoras and Epicurus are well blended—vegetable diet and cream-sweets, while the stoic mode of living of Diogenes—no house, no home, is simply a virtue of necessity.

[36] "The Demon of Cawnpore."

[37] In the *Indian Daily News* of August 7th 1886, an article headed—"A well-to-do beggar," is an instance.

Another instance of a similar kind under the heading—"Robbing a rich beggar," was reported in the *Indian Daily News* of 22nd September last. The owner, a mendicant, went out begging to add something more to his hoard. His disciple was left behind to watch the house. On his return he missed both. He then informed the Police and the party charged was arrested with the missing property in his possession valued at Rs. 333; and as the case was clear, he "was convicted and sentenced to six months' rigorous imprisonment."

Ulcerous beggars, are unfortunate lepers covered with "wounds and bruises and putrifying sores." A subject to be pitied rather than despised and for whom though there is an asylum, yet why they are allowed to go about the streets and bazars and mixing with people with an infectious disease upon them, is certainly unaccountable.[38] Aye often they may be seen selling goods in bazars.

BOY-BEGGARS.—These are the street-Arabs who haunt bazars and public places, and may often be seen whining along Tram cars for a pice or so from passengers, and when an ana or two are gathered, they run to a bootic shop for food and next to a liquor shop for drink, where they imbibe not only a bad habit, but pick up not a little to make them hereafter dangerous. The origin of juvenile delinquency is to be ascribed to this cause. When friendless and homeless urchins are found so acting, they should be taken up and placed in some Reformatory, and when after a time, they are enlarged, they would come out with a knowledge of some calling so as to make themselves useful and not hurtful to society. There are instances, that, many by timely attention have been so corrected as to be a blessing instead of a curse.[39] It need hardly be observed, that, a matter as this also needs attention.

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[38] Nigh thirty years ago, in the Police Act, (then passed) there was a section relating to these as the professionals, but owing as usual, to laxity, it is made inoperative. For the common good it should be revived.

[39] "Masonic Herald," April 1871. Art: "The cambric handkerchief." An extract from the Ragged School Union Magazine.

There is a fifth class, that comes within this pale, who may be termed—self-made beggars. People who either from drunkenness or recklessness, have reduced themselves to this sad state, but as they are subjects of the Reformation Society's kind attention therefore nothing more need be said about them.

OUR LAUNDRIES.

"It is evident, that, the *dhoby*, at his present stage of evolution, is by no means perfect, and it is very doubtful whether he is improving. Obeying the great law by which he came into existence, he must either progress or retrogress, and it will be an interesting point for our descendants to note, whether he will, in the end blossom into the perfect *dhoby*, to whom buttons shall be sacred and shirts to be treated 'as though he loved them.'

"Cats, thorn-bushes and similar articles should be interdicted and a more enlightened method of washing substituted for the present one. These reforms may seem too radical, but *dhobies* should be asked to remember, that, the abolition of themselves would be still more radical, and that their customers do not invariably agree with the precept—"Take no thought of your raiment."—***Madras Mail.***

ON the subject of apparel-washing; we cannot help citing one *in extenso*, who had seen much and has written well, and as from our own observations, we know the statement to be correct, therefore gladly record it here without adding any lengthy remark thereon to warn people against a danger which may not inaptly be termed—a personal evil.

Mr. W. J. Simmons, in his lecture—"Decay and Germ theory of disease," says:—"The filthy cleanliness perpetrated by our *dhobies* under the pretence of washing our clothes beggars description. Their absolutely criminal recklessness in receiving the garments of healthy and diseased customers alike, deserves to be brought under special legislative control.[40] I know the case of a gentleman, who on hearing, that, his *dhoby* was ill, but having some suspicion about it, took the trouble to go to his house, and found the man down with nothing more serious than confluent small pox, and rolled up cosily in a large table cloth, belonging as he said, to another *sahib*.[41] Now a few days later, this other *sahib* was himself attacked with small pox.[42] Have you a reliable guarantee, that your *dhoby* is a more careful washerman ?

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[40] Not only this, but several others need law restrain.

[41] These *dhobies* have a bad habit of using the clothes of their customers. It is not unusual to see them in winter, warmly clad in Guernsey, socks, &c., belonging to their *Sahibs* or masters. And some so clad, are covered with itch.

WATER USED FOR WASHING PURPOSES.—"I shall now," continues Mr. Simmons "throw some light on tanks in the suburbs where most of our clothes are washed. I lived for about four years in Ballygunge, not far from a small tank by no means a very dirty one, which was patronised by a gang of *dhobies.* One evening, we heard, that, a man suffering from the same terribly infectious disease—small pox, had committed suicide by drowning himself in it. The story was exaggerated, for the man was not drowned but dragged out of it by a whole clan of *bhais,*[43] but there was not the smallest doubt, that, with the small pox on him, he had rushed into it. The next morning we found, the *dhobies* at their work as usual, beating the clothes to shreds on their planks.[44]

BUSTEE TANKS.—"We may not all have had the privilege of observing what goes on in a *bustee* tank ; and as it is important, you should know something about it, I shall tell you what I have seen of one which I had special opportunities of observing for about three years. The window beside my writing table looked out on it, and it was comparatively close. These tanks are never dewatered or thoroughly cleared, they are big tubs with no outlet, and in which men, women, and children wash themselves. They also wash their pots and pans, clothes (by no means the cleanest) and bedding (about which the less said the better) from generation to generation, the water of which as Dr. Harvey told us in his lecture, is "twice as bad as London sewage."

"Regarding the tank in question, I have myself seen persons fresh from an attack of small pox, take what was in all probability their first bath. Imagine the amount of desquamation that went on during that first bath! But this is not all. People used to wash horses, bullocks, dogs, dirty boxes and hackeries in that very tank, and for a short time a poor leper in an advanced stage of disease, used to bathe in it.

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[42] Likely the gentleman took the disease from that very table cloth when brought home, as small pox, like the itch, is catching.

[43] *Bhai*—means a brother. It is also used for one belonging to the same cast, country, or calling.

[44] Owing to such causes, that, lately an article appeared in the journal mentioned above, suggesting to 'start *dhobies,*' "Improvement Society," and so prevent "the conversion of damask table cloths into rough lace work within three washings."

"On one occasion, several members of the Health Society visited the *dhobies'* tanks at Kidderpore. The first we went to, contained very dark coloured water, due as Dr. Mittra informed us, to the dyes washed out of clothes. The smell from it was not much unlike as that emitted from a vase of stale flowers, and was so strong, that, we were glad to get away from it. The clothes washed in it belonged to soldiers in the Fort.

"At another tank visited the same morning; we found a man afflicted with ulcerative leprosy actually engaged in washing clothes. We looked over hundreds of towels shirts, table linen, ladies and children's clothes, and all bore European names. The picture is a horrible one, but I may tell you there are scores of similar tanks where similar scenes are enacted every day and which are every bit as bad as those mentioned."

Might not after this; our washed linen prove to be what Medea's gift was to Glauce—a poisoned dress; on wearing which she was seized with a burning pain and died in the greatest agony. Medea's action was one of revenge directed against an individual—her rival; but what is directed against us in this wholesale form, is not in revenge but in ignorance, which ought to be remedied.

Not frequently, people suffer from some kind of cutaneous complaint, which must be ascribed to some latent cause, arising probably from bad water washing, and brought home to us in our so called clean clothes.[45] And bad as this is, it is a matter of surprise, that, it is not worse. But as now the subject is prominently noticed, it is hoped, it will seriously be considered for the common good.

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[45] Some poisonous matter as already remarked, is so very strong and adhesive, that, were a cloth after being steeped even in its solution for a while and then washed, it would still retain in some degree the virus imbibed.

To secure cleanliness, after what has been shewn, it seems desirable to form some new tanks, if not to dewater those now used, and after thoroughly cleaning them, have them filled by mechanical process if good water is available, if not to wait for the periodical rains, as guard them against pollution. This

V.—URBAN IMPROVEMNTS.

WIDENING ROADS.

Touching this matter, it has been remarked, that, "it is an expensive game." And so it is, if we make it! So far back as 1863, we had suggested,[46] that, whenever an old building in a narrow street, or in a crooked lane, was pulled down; were then a few feet of ground according to requirement, taken, in time, the want would easily be supplied, and thus many streets and lanes improved without that bugbear—money, hanging over us as an incubus. But if expressly for the purpose were buildings purchased, then in that case, it would really require a mint of money and where would it come from?

To effect an object as suggested here, a sharp look out should be kept, so that whenever an opportunity occurs, advantage should be taken, and landlords would rather be glad than otherwise, as it would enhance the value of their property. In the absence of a free-gift for a public purpose; they would gladly sell the portion required on half its value in the hope of raising the price of their property in future, since in a narrow street or lane, the prospect of gain is not so bright as it is in a broad one.

Only a few years back, two old buildings were pulled down—one in China Bazar Street, and the other in Burra Bazar Street, and as both these streets are so very narrow, that two carriages can hardly go abreast; widening them would indeed be improving two great thoroughfares of the Town; and had advantage as shewn, been taken, these streets as many others which are eye sores, would in time, be made as broad and as good as Old Court House Street is. Unfortunately opportunities were allowed to slip by. However it is not yet too late! Errors can be corrected at any time, if we are only disposed to do so.

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no doubt, will entail some expense, better so, than be tormented with pustules, or with something worse still.

Whether the *mydan* tanks could be utilised for such a purpose, is a question, which needs consideration.

[46] *Vide* my "Observations on the Municipality of Calcutta, shewing what is desirable for present good and future security."

Owing to a want of proper supervision, Sections 26 and 27, as also 97 and 98 of Act XIV of 1856, were never duly observed. Had they been, scores of lanes and streets would have stood improved by this time.

ROADS TO BE KEPT CLEAN.

There should be a law prohibiting people throwing house sweepings on the road side, which are often scattered by birds and beasts, or are driven about by the wind; but to throw them in dust-bins placed at reasonable distances from such houses. A measure as this, if duly enforced, would keep the streets clean at all hours. At present though the sweepings are removed in the morning, but what remedy is there, if any thing is cast out at noon or in the evening, as it is often the case, and which would remain where cast, until removed the next morning. Perhaps it may be said, that, there is a law against the practice, and so it may be, but who regards it, or who prosecutes people for infringing it. Such however would not be the case, were sections small and supervision strict.

Rev. Dr. G. B. Cheever, speaking of Aoste already noticed, says, that, almost all the inhabitants are subject to two fearful complaints—*Cretinism* and *Goitre*, *i. e.*, mental weakness or idiocy and neck swelling or as it is termed *bag-neck*. Dr. Saussure supposed, that, these were "occasioned by a vicious atmosphere;" owing to which, a strict law was enforced, directing, "that every person shall be held to keep the street clean before his own door, carefully removing all the dirt and preventing its accumulation."

There should also be a law here prohibiting people as passing along, throwing fruit peels, leaves, or any thing else on the road, or sitting down on the road-side and eating, and then leaving the refuse behind them, instead of gathering it up and throwing it into dust-bins. Strictness in a matter as this, though it would not prevent people from eating, yet it would prevent the streets from being kept dirty, and thus the services of at least twenty sweepers at Rs. 5, per mensem would be dispensed with, consequently effecting a clear of saving of Rs. 1,200, per annum—perhaps more.[47]

Another fact bearing on this subject might be mentioned, that such nuisances are often washed into the gratings during the rains and thus choking free passage, and owing to which cause it is not an unusual thing to see streets flooded after a heavy shower, and the water subsiding not in an hour or so, but after a considerable length of time.

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[47] Were savings so effected, diffused to meet deficit in the reduction of taxes on the poor, it would be doing not a little. Those who are doing well may not care for a pice or two, but to the poor, the amount though little is yet much. In my *bustee* visits, I have seen their state and know how much they suffer.

Hackney carriage stands, from a want of a restrictive measure, may be considered as another cause of this evil. Invariably hacks while attached to the carriage, are fed on the road side, with the object, that, in case of a call, no time be lost in harnessing them, but to drive off immediately to secure the fair, leaving in the haste, wisps of hay or grass behind them, which are either scattered by the wind, or are washed down during the rains, choking pits, and thus stopping free passage of water.

Touching this matter, the proper course should be to make owners and drivers feed their animals in the stable, as it is done with gentlemen's horses as those belonging to Tram cars, and when done, to get them ready for work. Whereas the half-measure as now practised, independently of the evil it entails; it is cruel, not allowing a quiet feed to poor beasts for their hard labour. This ought to be stopped by a beneficial *lex loci.*

FOOT PATHS.

These no doubt, were formed with the best of intention—use, but by a stange perversion, they are now turned into abuse owing to neglect. There are scores of such paths in the city which have been converted into a kind of verandah, where people sit and talk and smoke—often take their meals, split wood, dry and sell goods, and at night in the hot weather, sleep; thus thwarting the very object it was contemplated to effect—safety of people from carriage accidents.

Touching foot-paths, in another point of view it may be observed, that, being badly constructed, they are any thing, but pleasant during the rains. They should be solidated and made sloping, so that no water might lodge on them, but run down into paved receivers below on the road side and thence into the gratings. By a process as this, they would be kept clean and dry, and not as they are dirty.

Simply to level and beat them down to impart an appearance of finish, would be doing nothing. The ground being soft and not well metaled, it imbibes water, and in tramp, it becomes so very miry, that, it is impossible to walk on it.

ROAD-SIDE TREES.

These are anything but ornamental. Having not been cared for when young, most of them have grown awkwardly. Some in extending their branches, have encroached on foot-paths, others hang over roads; throwing at night, a shade on street lamps, and not unfrequently in stormy weather, interfering with Telegraph wires. Were they however supported with props when growing, they would rise straight, up; or lopped when straggling, they would not be what they are now—an obstruction in some places and a nuisance in others; as in shedding, they cover the roads with leaves which keep flying about in all directions by the wind. The street sweepers collect those they find in the morning, but what of those which drop at noon or in the evening? They must remain wherever they fall till removed the next morning. A state as this, it is clear, will not permit the streets being kept clean.

Speaking of trees. We agree with Professor W. E. Roscoe, that, they "purify the air by taking up the carbonic acid and breathing out (by means of their leaves) oxygen gas;" but on the other hand too many as they are at present, according to Sir James Clark, cause not only "impure humidity, but act injuriously by impeding free circulation of air."

On this subject, a short time back, a controversy raged and not, as believed, unreasonably; assigning trees to be the cause of creating a new complaint in the city, called the "Calcutta fever."[48] That it is so, we cannot well answer it, but *a fortiori*, the probabilities are in support of the theory on the ground, that, ozone, though life preserving, is not sufficiently strong to resist the combined effects of malaria and zymotic, ascribable to damp soil and foul air.

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[48] *Stateman*, September 18th and October 2nd, 1886.

Apart from these! There is another point, ornamental as it may be termed; which cannot well be passed over. It is obstruction. Often owing to their density, trees as may be seen, prevent view. For instance—the Government House. A fine building in a prominent part of the city is completely shut out from sight by almost an impervious belt surrounding it; instead of which, were flower shrubs and crotons planted, they would not only look well, but prevent humidity by allowing free entrance to the sun's ray.

En passant, it may be remarked, that, St. John's Church-yard on its western side, is covered with large wild trees; were they removed and in their places, fruit trees planted; the produce of which if given to the poor, or sold to serve them, not a little would be done to promote a good cause. And the cost for doing so, would almost be nothing, as the sale of the wood of the old trees, would more than repay for the purchase of new ones.[49]

HACKNEY COACH STABLES.

These form another subject of complaint, as a matter for consideration; since they are not only in public streets, but often beside and between dwelling houses, and from want of care they are always kept dirty, hence the cause of troublesome flies, fetid stench, and worse still the strong poison they diffuse.

Speaking on this subject, Professor H. Tanner, in his "First Principles of Agriculture," says:—"Animals draw into the lungs atmospheric air, use a portion of the oxygen and throw off carbonic acid, which is a dangerous gas; for no animal can live in it, and it should therefore be carried off from buildings. An instance shewing the deadly character of this acid, occurred on board a vessel which was bringing sheep from Holland to England. In consequence of stormy weather, the sheep were placed below deck and the hatches closed so that they could get no fresh air. When the hatches were opened, it was found, that, the sheep were dead. They had been poisoned by breathing the carbonic acid thrown off from their lungs, instead of breathing pure air."[50]

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[49] The same remarks may as well be applied to other churches which have extensive ground around them, and which being utilised, would yield something good for the poor of the parish, since they cannot get what the more fortunate enjoy, owing to want of means.

It is said a zealous rector of a college who on finding a large vacant space at the back of the building, planted plantain trees, and in a short time, the students enjoyed fruits ripened on the tree which are more wholesome than those which are forced ripe, as found in bazars.

This is an instance, shewing produce. There are others which by care and attention could be made equally as productive, *e. g.* plantain, papia, sugar cane, custard apple, bear within a year, as also mango, lichi, guava, loquot, lime, plum, pomegranate, &c., if grafted off a bearing branch and planted on good soil.

These remarks as those relating to *Dhobies'* tanks, are mere suggestions, their adoption or otherwise, is for others to consider.

A correspondent also in one of the Dailies[51] writing regarding "the intolerable plague of flies caused by stable sweepings and refuse thrown on the Race Course," says, "they are a nuisance to the residents in the vicinity, as also to the unfortunate sick in the two Hospitals—General and Military." Now these places are at some little distance from the course, and if the evil is rife there, how much more so it must be when it is immediately about or directly against houses.

Were these stables properly paved, sloped, and drained so as to prevent retention or accumulation of filthy matter, solid or liquid; it would certainly be an improvement, whereas such is not the case, because they are not looked after as they should be, and why? Here is the reply—"No time! Much to do! Cannot do all!" and thus evils remain where they stood to do harm and no good. Here again the necessity of the Town being divided into sections for better supervision, becomes desirable.

In the latter part of 1882, as in the early part of 1883, Major A. C. Bigg-Wither, from a kind feeling, wrote two apt letters in the *Indian Daily News*, on the subject of stable evils. They at the time startled not a few, then as usual, apathy supervened and no one thought more about them. To effect good, we must not sleep over evils, but endeavour to remove them, else Shylock's 'sufferance badge' we must wear quietly and groan under it, patiently.

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[50] Often stables are constructed on the ground floor of houses, while the upper apartments are used for accommodatiom. This is adopted for want of space in detriment to health; forgetting, that the noxious gas emitted below rises up, and in sultry weathor when there is little or no wind; diffuses itself every where, breathing which is extremely injurious.

PARIAH DOGS AND JACKALS.

These animals are really a *crying* nuisance. Regarding the dreadful shrieks of the latter, one may well exclaim—

> " When shall I cease to see and hear
> The howling fiends of night."

According to classical *caniculares*—Homer foremost; the fear of rabidness in dogs as Mr. J. Carpenter says in his " Dog-days and the Dog-star," is from July to September, but in this country the influence of *Sirius* is felt much sooner and continues much longer, often from March to October, hence the necessity as recommended of " Muzzling and leading our canine dependents." So far good! But what protection is there against the inroad of *pariahs* which are semi-wild, and like jackals, roam at large and live on rots and refuse, the suceptibility of madness therefore in them cannot but be greater, and consequently the exercise of caution should be equally so. It is well known, that, at certain season, their temper becomes irritable, so much so, that, even a house dog is known to snap at.

The dailies invariably report of some unfortunate person having been bitten by mad dog from the effect of which, he subsequently died of Hydrophobia; or some poor labourer's child having been taken away by a prowling jackal; hence for common safety, these should be exterminated, if not at least lessened. There is no difficulty in the case. " The last wolf killed in England," is a matter of history.

Often the cry of jackals at night, close to a house or under a window, has caused no little disturbance in a family where there are little children, aye often causing nervous complaints. As for devastations committed by them in poultry-yards, are too well known to be repeated.

Other instances of a similar kind might have been adduced, but " time would fail." What however have already been adduced, are enough to shew the extent of evils, arising from no fault of any one, but from a defective system of working; the correction of which is needful for present as future good.

VI.—CONCLUDING REMARKS.

> "Words are things, and a small drop of ink
> Falling like dew upon a thought, produces
> That which makes thousands, perhaps millions think."

We have here in like manner given our thoughts in the hope, that, they may produce something so as to make not a few think; and in doing so, we have compressed as much as we possibly could within a small compass with the view, that, they may clearly be seen and easily understood.

An eminent physician once remarked, that, there was a remedy for every disease. And so it is in regard to every complaint; but the application to remove it, must not only be timely but efficacious.

By reason of our study and observations, we are of opinion, that, three things are absolutely necessary to put down evils as shewn, and on which we shall now briefly dwell upon. They are—

1st. Laws to be enforced.
2nd. Division of labour to be observed.
3rd. United effort to be made.

LAWS.

During the late sanitary discussion, a journalist remarked, that, "a *fiat* was desirable to abate evils." Another thought, that, the law as it stood, was not "workable." A third thought something else. We however think differently. We think, the law is good, but owing to some cause it is not enforced as it should be. This averment of ours stands supported in "the milk case,"[*2] which was heard in the Police Court, on the 6th July last, the party being charged with selling unwholesome food under the 273rd Section of the Indian Penal Code, which is as follows:—

[*2] A milk-seller was charged with selling milk of a diseased cow, with blood and matter in it; and on conviction, was sentenced to three months' rigorous imprisonment. The case was reported and those who read newspaper were apprised of it, but not so the mass of the people who do not understand English; for their information, the case should have been made known by beat of tom-tom. This certainly would have a good effect on sellers of edibles. It is a good practice in Railway Departments, that, the names of people who are punished for infringing their rules and regulations, are placarded, so as to operate as a warning upon others. The object of law is not revenge but example, which if not made as it

"Whoever sells, or offers, or exposes for sale as food or drink, any article which has been rendered or has become noxious, or is in a state unfit for food or drink, knowing or having reason to believe, that, the same is noxious as food or drink, shall be punished with imprisonment of either description for a term which may extend to six months, or with fine which may extend to Rs. 1,000, or with both."

The comprehensiveness of this section cannot for a moment be questioned, yet, strange, it was never thought of before. "As food and drink," scores of unwholesome things are daily sold and are not-noticed, not because they are not noticeable, but because no one thinks to notice them.[53]

Independently of the Penal Code, we think a comprehensive local law is desirable for the good of the city. On the ground of humanity, it will not be denied, that, we need it against the sellers of "Infallibles," as against quacks and devil-drivers. Perhaps there is a provision against such people, but their inoperativeness is tantamount to their non-existence. They are not unlike what once *Junius* said of laws "which though not repealed are fallen into disuse and are in effect a snare to the unwary.[54]

Of "Infallibles," it may well be said, as was said of razors, which the bumpkin bought—"Made to sell."

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[53] Regarding food or drink, a bill to amend Act IV. B. C. of 1876, has lately been passed. It is a good bill and to have its object duly caried out it should strictly be attended to by co-operation—the Police and the people; else in time like many others it may become dormant—perhaps die away.

The sale of rotten fish, and not unfrequently rotten meat, particularly venison, is still carried on, which should be stopped with a firm hand. A few years ago, but with what wisdom it is hard to say; an overseer on Rs. 300, a month, was appointed to supervise all the Town bazars—a score of them. A Herculean labour to be accomplished by Lilliputian effort. The impossibility soon became apparent, and what was taken up with a flourish of trumpet, soon dropped into a piping note. Whereas such would not be the case had regard been paid to division of labour. Six young men on Rs. 50, a month, would decidedly do a great deal more than one man on six times as much.

The same remarks may well be applied to all works so divided for greater efficiency and wherein not only bread would be secured to a greater number of the poor, but upon a smaller salary, a larger amount of work would better be done.

[54] Letter XVIII., dated July 29th 1769.

Of quacks it is said, that, compounders of hospitals and dispensaries ply in villages as medical practitioners.

Sometime back, it was reported, that, a poor man who was suffering from an eye complaint, was urged by a pseudo occulist to have an operation performed. He submitted, and the consequence was that, the "eye ball burst."[55]

Often when a person from any paroxysm is delirious, it is said, he is possessed of the devil, and a conjuror or devil-driver, is sent for, who with his chantings enough to make a healthy man ill, pretends to effect a cure. How many an unfortunate has been thus killed rather than cured, there is no knowing.

It would, we think, be doing not a little, that, whenever a policeman finds a sick person not well attended, or is so tormented, to have him removed to some Hospital where under proper treatment, he would have a greater chance of living than of dying.

Touching the question of law, it has justly been remarked, that, wherever it is losely administered, evils will be rife there. Impunity operating as an inducement to wrong. "True," says the author of the *Gaol Chaplain*, "want may supply a motive for petty larceny, and revenge light up the neatly rounded-rick, or a well plenished barn, or sudden passion prompt the deadly grapple on the highway, but in the vast majority of instances which have come under my observation, the persuasion, that, detection was improbable, if not impossible, fathered the offence."

In the *Indian Daily News* of August, 30th 1886, it was stated, that, "a native" was charged with torturing a rat "by dipping the poor creature in Kerosine oil and then setting fire to it." But he was discharged, because the case "did not came under the category of animals." The Act—cruelty to animals, bore a reference only to beasts of burden, and such as are used for food. The ruling according to the letter of the law, was no doubt, correct, but its spirit was lost sight of, which ought not to be. A rat, as a pest, may be destroyed, but not tortured. If it is reprehensible to set one's foot needlessly "upon a worm;" how much worse still it must be to act as shewn, so very cruelly, and for which some punishment as example, was desirable and not simply to be "regretted" over.

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[55] *Indian Daily News*, March, 31st 1886.

In the case—"Sale of indecent prints," (according to the *English Mail* newspaper, London, August 20th 1886)[56] there was as said "a conflict of opinion among the magistrates as to whether the law had been broken. Some magistrates in the West End, declined to adjudicate, on the ground, that, they did not think, the law had been broken, while others held a contrary opinion. Alderman Sir A. Lusk, presiding at the Mansion House Justice Room, had two cases of the kind brought before him, and he expressed himself very strongly on the subject. He said, he had seen one of those prints, and in his opinion, it was decidedly indecent. No father of a family would like to have such a publication exposed before his daughter, and the city authorities, in the exercise of their duty, could not properly allow such pernicious literature to be exposed for sale in the public streets, calculated as it was to corrupt and demoralise the young. As this was a first offence, he should only impose nominal penalties, but he expressed his determination to deal severely with any future cases that may be brought before him."

In this case, the magistrates who declined to interfere, must have travelled according to the letter of the law. Alderman Lusk, arrived at a clearer conclusion by travelling according to the spirit of the law; taking a common sense view to effect a common good.

In the rat-case, doubt not the magistrate who heard it, also travelled according to the letter of the law; but under the heading—"Cruelty to animals," (a rat being an animal) he might have imposed as a first offence, a nominal fine as a deterent, and then by application could have had the Act amended to prevent a recurrence.

It is said, the law aims at perfection,[57] but how is this to be effected except by revision. In the indecent print-case, as in the rat-case, sections cited to base the charges preferred, were probably open to construction and owing to which arose this diversity of opinion, which should have been noted and afterwards improved by a supplementary Act, so that it might easily be understood and promptly acted upon, and not be left open as subjects of doubt and difficulty to future times.[58]

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[56] Calcutta, September 11th 1886.

[57] Lex appetit perfectum.

DIVISION OF LABOUR.

DIVIDE ET IMPERA, is not a meaningless aphorism, its truthfulness has once too often been tested to be questioned.

The same aphorism may well be applied to work; and particularly more so to our Municipal divisions of the Town which are too large to be properly looked into; but on being partitioned into sections, they would better be attended to. The present system of supervision being inadequate—it is *pro forma*; which is next to nothing.

It is not unreasonable to suppose, that, a man can only do as much as he is able to do and no more. Nature cannot be taxed beyond endurance; but if we insist doing so, we would be raiding against impossibilities. Here is an instance in illustration. An overseer of a large division has ordered his men to do some urgent work and having so ordered, has passed on to some other part of his beat; but whether what he had ordered has been executed or not, he has no means of knowing until the next morning when he is out again; but on a smaller extent of ground, instead once he could go over his beat half a dozen times; and thus nothing could escape his attention. Everything being done as it should be done. Whereas over an extended surface, this cannot be effected; it is too large to be run over a second time, and hence the cause of complaint, that, supervision as needed is not accorded, and the man is blamed for the error of the system which causes remissness.

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[58] It must be remembered, that, a machinery as a law, though considered well constructed or well framed, nevertheless, the clogging points in neither will be perceivable until it is worked, and whenever such is the case, they should be submitted for correction, and thus be made perfect, but to pass them over in silence on the ground of non-jurisdiction—no provision, and the like, would be doing nothing. Errors should be rectified and not continued.

By division of labour, another advantage would be gained[59]—mutual aid. The Municipality helping the Police and the Police helping the Municipality. Two distinct bodies being so arranged by due organization, as to assist each other to effect one object—putting down evils. And not as it is now—departmental. The wrong to be noticed by one, is not so noticed by the other because it does not come within his cognizance. The term *common cause*, for the common good, is not understood as it should be. And even were it understood, it could not be acted upon, owing to the largeness of the division, the inspector over it, is hardly able to do his own work, much less help another.

To causes as here detailed, that, about two years ago, the complaint against Municipal shortcomings arising from a bad system of working rather than to any thing else; became so "loud and deep," that Government very properly, ordered a Commission of Inquiry,[60] and though since things have somewhat improved, yet they are not exactly what they should be owing to wants as shewn, being still in the department, and as long as these will remain so long will defects be seen and evils felt.

Touching our Drainage, a *Vexata quæstio* as said, we have said nothing, because we have never seen it work; but in the face of the cry against it, it was remarked, that, all was right. If so; nothing need be urged, but should it be otherwise, then it is a case! At what moment a plague might break out there is no knowing, but should it, it is feared, half the city will probably be swept away as had occurred in other countries—

> "What livid deaths has sad Byzantium seen,
> How oft has Cairo, with a mother's woe
> Wept o'er her slaughter'd sons and lonely streets."

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[59] A third advantage, arising of itself, ought not to be lost sight of. It is the cleanliness of one section being a tacit proof of the laxity that exists in another. Thus by rivalry rather than supervision, business would better be done. One trying to outvie the other to gain credit.

[60] Art: "The Municipal crisis." *Indian Daily News*. September 15th 1884.

THE MEDICAL PROFESSION IN INDIA:

ITS POSITION AND ITS WORK.

AN ADDRESS DELIVERED BEFORE THE INDIAN MEDICAL CONGRESS HELD AT CALCUTTA IN DECEMBER, 1894.

BY

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THE

MEDICAL PROFESSION IN INDIA:

ITS POSITION AND ITS WORK.

THE PAST.

THE history of India is one of successive invasions, (1) from the north through Beluchistan and Afghanistan, across the Hindu Kush and through the Himalayan passes; and (2), after the discovery of the Cape route by Vasco de Gama in 1498, from the west and south by sea. The great Aryan invasions dispossessing and displacing the aborigines belong to the former category, together with the minor invasions by Greeks, Arabians, Afghans, and Moghuls. To the latter belong the advent of Portuguese, Dutch, Danes, French, and English.

The history of medicine in India accords with these facts, and resolves itself into three phases:

1. The Vedic system, elaborated by the Aryan invaders contained in the Ayur Veda, the greater part of which has been lost, but the substance of which has been preserved by tradition and the work of commentators, the chief of which are Charaka and Susruta.

2. The Arabian or Yunani system imported into India by the Arabians, Persians, Afghans, and Moghuls.

3. Rational medicine introduced and developed by the English.

The Vedic and Yunani systems are represented by the

Kavira's and *Hakims*, of whom a good many still practise in the country districts, especially in Western India. Rational medicine has, however, under the auspices of the English Government, become the dominant system.

The evolution of rational medicine in India may be represented thus:

1. The hospital, military and civil, in which country-born youths, Eurasian and native, served as compounders and dressers and acquired some knowledge of Western medicine. The best of these pupils were taught more or less systematically by the Company's surgeons, examined and certified as apothecaries and native doctors. This system of hospital education survived until about a quarter of a century ago, and some excellent men were turned out who rendered useful service to the State in subordinate positions and became also helpful to the people as private practitioners.

2. The school. The "Native Medical Institution" was organised in Calcutta in 1822. Systematic instruction was given and a superior class of native doctors trained and certified.

3. The college. In 1835 the Medical Colleges in Calcutta, Bombay, and Madras were founded and medical education placed on a more scientific and elaborate basis. Dissection of the dead body was first practised in 1836, Pundit Modusudun Goopta, a high-class Brahmin, taking the lead in breaking through the caste prejudices which had hitherto prevented Hindus from pursuing practical anatomy. The College educated three degrees of medical practitioners. One, the sub-assistant surgeon class for charge of civil dispensaries, etc., fully taught and carefully examined; the second the apothecary class for subordinate service in European military hospitals; and, the third, the native doctor class for subordinate service in regiments, gaols, etc., whose education was of a less ambitious kind, but sufficient for the object.

4. The university. The University of Calcutta was incorporated in 1857 on the model of the University of London as an examining institution empowered to grant degrees and licences and to affiliate colleges in its various faculties, the teaching in which came up to certain standards. Medical

students have thus been enabled to acquire a diploma or licence in medicine and surgery and the degrees of M.B. and M.D.

Medical education in the Bombay Presidency has closely followed the lead of Calcutta and the Bengal Presidency. The Grant Medical College was founded in Bombay in 1845. It was called after Sir Robert Grant, Governor of Bombay, whose friends and admirers collected money for starting the College, which may therefore be considered a memorial of Sir R. Grant. The College educated all classes for civil and military employment. The teaching was in English, and after examination diplomas were given to graduates and licentiates and certificates to hospital assistants. The institution was originally established mainly with a view to provide for the public services, but many of the graduates and licentiates sought employment among the public of Bombay and other large cities of the Western Presidency as private medical practitioners. These men have succeeded well, and gained respect, reputation, and many of them large incomes. The University of Bombay was founded in 1857 on similar lines to the University of Calcutta, both being examining bodies modelled after the University of London. The Grant Medical College was affiliated with the University as a teaching body, and degrees and licences were granted by the University after examination by University examiners. The degrees thus granted are M.D., M.B., and a Licence in Medicine and Surgery is also given. The standard of teaching was raised, the curriculum extended, and the subordinate (hospital assistant) classes removed to schools which were organised at Poonah, Ahmedabad, and Hyderabad (Scinde). Teaching in these schools is also conducted in English. The Jamsetjee Jejeebhoy Hospital is the clinical school for the Grant Medical College. The latter has had a very useful and progressive history during the last half-century under such men as Morehead, Peet, Giraud, Hunter, Blane, Vandyke Carter, H. Cooke, Wellington Gray, etc.

The Parsees have taken very kindly to medicine, and some of the most distinguished graduates of the Grant Medical College and University of Bombay belong to this community. Hindus, Portuguese, Jews, Eurasians, and a few Mohammedans constitute, together with the Parsees, the great majority of the alumni of the College. I have no figures to show how many medical graduates have been furnished by the College and University, but the number is very considerable. The training of assistant surgeons for the public service has constituted a most important and successful feature of the College.

On the whole, medical education has attained in Bombay a high and stable position, and the requirements of the public and public services are supplied in a thoroughly satisfactory manner. These results have been attained through the instrumentality of the Indian Medical Service. No private medical school has been started in Bombay, nor have attempts made by private medical men to assist in the clinical work of the Grant Medical College been successful. In 1891 the students of the Grant Medical College numbered 222 (including 26 females); 21 passed the final examination, 208 students were under instruction at Poonah, Ahmedabad, and Hyderabad (Scinde), and 47 passed the final examination.

The Grant Medical College Society is almost coeval with the institution from which it derives its name, and of which it may be considered a branch. Originally organised by the teachers and alumni of the Grant Medical College, it has, during its fifty years' life, enrolled the graduates first of the College and then of the Bombay University, until its members have reached the number of 165. These include about a dozen officers of the Indian Medical Service holding appointments in the presidency town, and some practitioners of Bombay with English qualifications. The Society embodies and represents the *élite* of the medical profession in the western Presidency, and constitutes a bond of union and instrument of mutual improvement among the qualified practitioners of Bombay, who are of diverse religion and race, of great social and scientific value.

Universities have been organised on the same plan in Madras and Lahore. Medical colleges have arranged their curricula with reference to the requirements of these universities. The colleges still educate, examine, and certify the military and apothecary classes, but the subordinate native classes have been removed to medical schools which have been established in large cities (Sealdah, Dacca, Patna, Cuttack, Agra, Poona, etc.), where a simpler course of instruction in the vernacular has been arranged. In the Bombay schools, however, they are taught in English, which they are obliged to know as a condition of admission to the school. Examiners are appointed by Government and licences granted by Government to successful examinees.

5. The education of women in medicine has of late years been systematically pursued, under the auspices of the fund organised by the Marchioness of Dufferin. The training of nurses and midwives has also been largely undertaken. The training of female practitioners of medicine is a matter of the greatest importance for India, as unless there is an adequate supply of such ladies, two-thirds of the population of India, that is, the women and children, will hardly be touched by our system of medical relief.

6. Veterinary instruction is imparted at schools which have been organised at Poona, Lahore, and Calcutta. The Macleod Veterinary School, in the neighbourhood of Calcutta, commenced work this year under very promising circumstances, and a large number of students are being trained there for civil practice.

THE PRESENT.

The undertakings described in the preceding section have borne excellent fruit. Medical education was at first organised by the State for the purpose of recruiting and training men for the service of the State; but the number of qualified men turned out by the college schools has for many years exceeded State requirements, and this surplus has sought employment in private practice in the service of native States, tea gardens, and other employers of labour. The services of Government doctors have also been placed at the disposal of the public, in so far as their private engagements do not interfere with their official duties, and Government pensioners have also engaged in the practice of their profession to a large extent. A considerable and increasing number of youths now proceed to Britain for the purpose of medical study, and return to India with British diplomas and degrees. The facilities of travel and development of commerce and industry have also encouraged more British licentiates and graduates to proceed to India for the purpose of earning a livelihood.

The Indian medical colleges and schools are in active operation. I find that during the session 1891-92 there were four Government colleges and ten medical schools in existence, in which some 2,400 students were undergoing instruction, and 400 were found qualified for the medical profession at the close of the session. I understand that a private medical school has been started in Calcutta under promising conditions, and I believe that others have been or are being started in other places.

One great and notable result of the educational movement initiated by the Government of India has been the establishment of charitable hospitals and dispensaries throughout India, which are officered by the licentiates and graduates of these schools, and in which large numbers of the sick poor obtain medical aid, indoor and outdoor. I find that 1,809 of these institutions were open in 1891, and that upwards of 14,000,000 of patients were treated in them. These are Government institutions, but there is a large number of hospitals and dispensaries supported by native States, municipalities and other public bodies, and by private persons not included in the list.

It results from what has been stated that the medical profession in India at the present time constitutes a very large body, which is divided into an official and non-official class; the former is in the employ and pay of Government in various capacities, and the latter relies for work and remuneration on private practice. The old systems (Vedic and Yunani) which ministered to the medical wants of the people in ancient times are now practically defunct in large centres, though in Upper India at least there is still a great deal of Yunani practised. The rude empiricism and erroneous ideas of life and disease, the crude formularies and rough, complicated, and nauseous compositions which constituted their principles, practice, and stock-in-trade are being gradually superseded by more rational and refined methods, and such as remain of the practitioners of these systems are an ignorant and dwindling class. Nor does there seem to be any possibility or hope of raising or improving them, or retaining anything of value which may have existed in their ways of detecting and treating disease otherwise than by subjecting them and their methods to scientific manipulation. The practitioners of rational medicine have now settled in large numbers in some of the great centres of population, and have also established themselves in the smaller towns and in populous villages in some parts of the Empire, but their numbers are still very small in comparison with the huge population of India, and the rest is in the hands of the native mediciners called *Baids* by the Hindus, and *Hakim* by the Mohammedans.[1]

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[1] I would not be understood as condemning Hindu medicine—which after all is not much more unscientific than a good deal of the "practice of physic" in Europe a hundred years ago—as mere barbarism and superstition. The truly progressive physician is he who keeps an open mind for all that may help him in combating disease, and who does not disdain to investigate remedies simply because they have no place in the *Pharmacopœia*. It is not unlikely that, at least as far as drugs are concerned, we may even yet have something to learn from Hindu medicine. In connection with this subject the following communication which I have received from a physician of the highest scientific attainments, himself a native of India, will be read with interest:—In the absence of knowledge of anatomy and physiology, chemistry and physics, the system of medicine was based upon erroneous pathology and therapeutics, not only in India but in Greece and Rome, and in other advanced countries of Europe up to the 16th century. Even at the present day medicine is based upon empiricism in practice, though in a few instances the *rationale* of the action of medicine has been satisfactorily explained. Medicine is still an art, and cannot be called a science. Improvement of surgery is the most marked feature of modern medicine, and is accepted in India beyond doubt and cavil. Clinical observation and the empirical application of drugs or remedies are the main features of the existing systems of medicine. Judging from these features, Hindu medicine might be said to have attained a great development in the treatment of tropical diseases of races inhabiting India. A cursory examination of the system will show that arsenic, mercury, antimony, sulphur, iron, copper, silver and gold, aconite and nux vomica, and a large number of tonics, purgatives, diaphoretics and diuretics have been in use for the same purposes for which they have been used within the last twenty-five years in Europe. The Hindu physicians knew nothing of the recent advance of the sciences; they followed no fashions in medicine; they adopted no bleed-

THE FUTURE.

For entrance to the Covenanted Medical Service open to all of Her Majesty's subjects who are qualified to enter on the *Register* of the General Medical Council, it is necessary, under the existing regulations, to appear before the examiners in London for the Indian Medical Service. The appointments are awarded by competition and are very limited in number so that the bulk of medical practitioners born and educated in India, and the majority of natives of India who return

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istered medicine. Their medicines, though crude, are often given in the most agreeable form, and are not half so nauseous as English medicine. Their medicated oils for inunction, and their system of massage or shampooing have been only introduced since a few years into Europe. Their system of diet is admirably adapted for Hindu patients in the majority of cases. These are strong claims of Hindu medicine. Let modern medicine study it, and then reject it if it deserves such a fate. When it attracted students in ancient times from Persia, Assyria, Egypt, and Greece, and when its practitioners were deputed to the Court of Queen Semiramis of the Assyrian Empire, it might present still some useful hints to modern medicine. Professor Wilson, a profound Sanskrit scholar, is of opinion "that the Arabians of the 8th century cultivated the Hindu works on medicine before those of the Greeks; and that the 'Charuka,' 'Susruta,' and the treatise called 'Nidana' were translated and studied by the Arabians in the days of Haran and Mansur (A.D. 773), either from the originals, or more probably from translations made at a still earlier period into the language of Persia." These are the antecedents of Hindu medicine. Rightly or wrongly, the Indians still hold it with veneration. Unlike an Englishman, the Indian lives in the past. His traditions are still the most valuable treasure he retains amidst the vicissitudes of his fortune. Spiritualistic in his tendencies he has a religious veneration for his old institutions. To deprive him of his traditions is not an easy matter. There is, however, hope, for even in his degeneracy he retains his intelligence and keen apprehension. Let the Congress forbear condemnation of the Hindu system, give hopes of fair inquiry into its merits or demerits, explain its defects and faults, and show by results that the European system is more rational and more successful. The European system has touched the fringe of the population of India. Scarcely over 2 per cent. of the population are affected by it, while the Hindu system still retains its vitality enough to remain almost the sole possessor of the field of medicine. Discredited it is not yet in the public opinion of India. On the other hand, it appears to have gathered fresh force from its modern revival by some able commentators and translators. The problem of medical reform in India resolves itself to the following: (1)

to India after having obtained a medical education and medical qualification in Britain must rely upon their own efforts to earn a livelihood among their fellow-countrymen by means of medical practice. Very many men have succeeded in gaining great reputations for humanity and skill, and in amassing large fortunes by this means; and few who have engaged in this work and applied to it honesty, industry, and kindliness, have failed to attain a position of respect and a sufficient subsistence. The Government of India has given, and as it would appear are more inclined than formerly to bestow, a number of appointments to medical men, European or Native, educated and qualified in India, that is, graduates of one or other of the constituted universities of India. So that for those who desire a career in Government employ (by no means necessarily a happy one as some persons would lead us to think) there is a good opportunity of doing so by hard work and good conduct throughout their career as students. But after all if it were desirable that the Government of India should increase the number of their medical officers educated and licensed in India they cannot give employment to all medical licentiates and graduates, and as time passes, the proportion of those who are employed by the State will become smaller, and the proportion of those who must rely on their

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system. Very little has been done in this work of real improvement. India is still the battleground of all known systems of medicine. A true spirit of scientific inquiry is still wanted. To infuse this spirit among all contending votaries of medicine is one of the grand functions of a Medical Congress. The Congress should encourage or undertake the following measures, and while thus satisfying all parties, it should direct the real path to progress. (1) Accurate translation of works of Hindu and Yunani systems, also of selected works on European medicine. (2) The appointment of a standing committee of representatives of all the systems to select the useful parts of each. (3) The introduction of anatomy, physiology, chemistry, and pathology in the indigenous Hindu and Mohammedan schools of medicine. (4) The establishment of medical societies and associations where medical men of all these systems can meet and discuss medical matters. (5) The researches into indigenous drugs. (6) The improvement of existing institutions and colleges of European medicine, and the introduction of practical education on a similar scale as in Great Britain. (7) A standing committee of all classes of medical men to consider and devise the minimum education required for private practitioners in order that Government may be moved to introduce medical registration into India.

own exertions larger. Nevertheless, the service of Government is open to all who can satisfy the conditions and requirements laid down by Government, and many of the licentiates and graduates of Indian colleges have, after qualifying in England, succeeded in obtaining admission into the Indian Medical Service,[1] while owing to the multiplication of dispensaries and the development of local bodies public employment has been given to a large and increasing number of Indian licentiates and graduates. This source of occupation promises still further to expand in the future. It has been urged that it is the duty of the Government to utilise more largely indigenous medical agencies, and it has been argued, in some parts of India, that an equally efficient and considerably less expensive medical service, more especially for civil duties, can then be obtained. The cry of "India for Indians" has been raised in this connection. It is to be noted, however, that this cry does not come from the Indian members of the profession but from a few non-official Anglo-Indians, and much feeling has arisen in this connection. Learn to have patience. Governments and suchlike institutions move slowly; let the profession in India, by original research and other work, elevate its members to a position when it will not be for them to ask, but to be asked by the Government to do their work because they are the best servants the Government can obtain. I am not without hopes that congresses like this may tend to the amicable development of adjustments which may open a wider field for skilled and duly educated native graduates of medicine.

The Government must be trusted for knowing the purposes for which its servants are required, and adopting the best means of obtaining these of the best quality and at the cheapest rate. The great field of employment for Indian medical men must in the future be, as in other countries, the general public and the great object of the medical profession, ministration to the needs of the population. The State can only give employment to a limited number of doctors, and the majority must, as do the lawyers, rely on private practice obtained in the cities, towns, and villages of the country.

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[1] The number of Indians in the Indian Medical Service is not at present more than 20, or 2 per cent. of the total strength of the service There is a falling off in the number of Indian students coming to England;

Accepting these statements as a true representation of the circumstances of the case, the indication for making the best of the present position would seem to be these:

1. *Patience.*—The superiority of rational medicine to any other system, whether superstitious, traditional, empirical, or fanciful, is indisputable; and the honest, earnest, and industrious pursuit of rational methods is certain in time to be appreciated and sought.

The development of local self-government and of sanitation in India will undoubtedly demand increasing numbers of medical *employés* in the future.

The sanitary services of India, when thoroughly organised, will doubtless absorb a large body of locally educated medical men. The enormous area of the country and the immense number of the villages and hamlets among which the population is scattered make it certain that when the time comes, when not only the water supply of the great towns, but the scattered wells and tanks on which the mass of the people depend, shall be under strict supervision, a very large number of native medical men, educated in European ideas of sanitation, will have to assist both in teaching the natives and inspecting their sanitary appliances. The regulation of the pilgrim traffic alone is no small affair, and while doubtless the organisation of the great gatherings will always be in European hands the actual charge of the numerous temporary hospitals and of the inspection stations, which must be established on the pilgrim routes, will fall into the hands of natives educated either in Europe or in the medical schools of India. The Mecca pilgrimage alone will give employment during part of the year to a good many.

2. *Co-operation.*—Jealousy between official and non-official classes is unworthy and uncalled for, and should cease,

and take the fullest possible advantage of these than envy or carp at his *confrère* whose path of duty has been differently and perhaps more pleasantly ordered. There is ample room in India for everyone.[1]

3. *Organisation.*—For the purpose of unity of aim and co-operation some organisation is needful. Congresses offer one means of bringing medical workers together for their mutual benefit, but something more permanent is needed. Registration of qualified practitioners is indispensable as a starting point. The formation of societies and associations would be extremely useful.

The formation of Branches of the British Medical Association or of an Indian association in imitation of the British Medical Association is one of the methods of organisation in which I may be able to be of some assistance to you and should be glad to be so.

4. Cultivation of Medical Science and Research, and the record of original observation regarding the nature of disease and use of remedies need to be greatly extended in India. Not very much of this sort of work has been done by Indian medical men outside of the Indian Medical Service. They have, however, great opportunities in the study of the diseases rampant throughout the land; much remains to be known regarding their nature, prevention, and treatment. I shall again refer to this later in speaking of cholera, malaria, plague, leprosy, etc.

NEEDS OF THE ARMY MEDICAL DEPARTMENT.

On this subject I shall venture briefly to condense the conclusions which close study of an immense correspondence has led me to adopt, subject to your individual or collective criticism and suggestion.

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[1] The census of 1891 indicated 514,074 " medical practitioners " of every sort in a population of 287,223,431; the large majority of these are unqualified. This is a most important point. The large cities swarm with unqualified quacks who much harm and discredit English medicine. It is very necessary that the law should put it out of the power of any one who has not a proper qualification to set up as a practitioner of English medicine.

1. Pre-eminent is the absolute necessity of amalgamating the Army Medical Staff and the Medical Staff Corps into a "Royal Medical Corps." It is simply amazing how this measure has been allowed for so long to go unnoticed and unaccomplished seeing that both Lord Morley's and Lord Camperdown's Committees[2] so strongly recommended it to the Secretary of State for War. If this measure were carried out the rank and titles question might also be set at complete rest by the grant of combatant titles; medical officers would then be officially styled, Lieutenant-Colonel ——, Brigade-Surgeon, Royal Medical Corps; Major ——, Surgeon, Royal Medical Corps; Captain ——, Surgeon, Royal Medical Corps; and so forth. Here substantive titles and rank would appear with the professional designations and the department to which officers belong. This exists in the United States Army.

Lord Morley's Commission subsequent to the Egyptian war, after pointing out the anomalous position of a department without subordinates and a corps without officers, expressed itself in the following terms. "Such an absence of discipline as has been commented upon in the Egyptian and other campaigns is apparently due to the unsatisfactory relations of the Army Medical Department and the Army Hospital Corps. The Committee recommend, after hearing conflicting testimony, that the corps should be merged in the department, and, like other corps in the service, receive the honour of being constituted a Royal corps." No more forcible recommendation could have been submitted by a body of mixed and competent officers. Similarly Lord Camperdown's Committee suggested the designation, "Royal Medical Staff."

Here then are successive Secretaries of State resisting the recommendations made by Commissions assembled on their exclusive authorities. Were these recommendations carried out, the grant of military titles would come in the usual course, and save army medical officers from being exposed to such humiliating situations as have been from time to time noted in the British Medical Journal, for example (1) the refusal on the part of a young combatant officer to salute a military medical officer on the parade ground at a health inspection of a corps, although the latter held a rank senior to the officer who was present on parade with the corps. (2) The correspondence and orders issued from time to time displaying personal feeling against army surgeons in the matter of their military titles under the new compound title system. In the armies where strictly combatant titles are granted to the medical officers, it has not been known or proved to interfere with the efficient performance of medical and surgical duties.

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[2] *Vide* the official reports of these Committees and their

Finally, the strongest argument in favour of combatant titles for the medical officers is this, that a strictly combatant corps (the Army Service Corps) is placed under the Army Medical Staff in war time. Powers of command and responsibility for discipline, it must be thoroughly understood, cannot be efficiently exercised without strictly military titles, for these only can convey to the warrant officer, non-commissioned officer, and private the authority for obedience. It is all a matter of common sense, and must so be faced by the present oppositionists.

2. There is a need for the establishment of messes for Medical Staff officers with a grant in aid from the Government. This point presses particularly in India where Government allowance is granted to corps of native cavalry and infantry and Royal Artillery (two batteries) whose average strength in officers is below that of the medical staff at headquarter stations or at all events similar.

The inequality of treatment in this matter placed on the medical department by withholding a Government grant for messes is shown by the following table and approximation in figures.

Corps.	Average No. of Officers Present.	Government Allowance Granted
British Cavalry	29 ...	Rs. 150
" Infantry	28 ...	" 150
Royal Artillery (2 batteries) ...	10 ...	" 100
Native Infantry	8 ...	" 100
" Cavalry	10 ...	" 100

The Medical Staff ask only for aid to messes at divisional headquarters, where now in some stations, medical officers keep up a mess entirely at their own expense without a farthing of help from the Government.

3. The refusal to grant charge pay for station hospitals in India is most inequitable. It was pronounced a just claim by Sir John Gorst while at the India Office in a correspondence with Sir Henry Fletcher.[3] A sliding scale of "charge pay" or "staff allowance" according to the number of beds in hospitals, and the responsibility thrown on medical officers, would be nothing but fair.

4. The pay for the rank of Brigade-Surgeon-Lieutenant-Colonels is unrecognised in India, although in every other part of Her Majesty's possessions officers of this rank are substantially benefited in the rates of pay.

5. The adjustment of the pay in India for surgeon-captain's rank is urgently called for. The surgeon-captain up to five years draws Rs. 317 8 annas a month and up to six years Rs. 335 12 annas, while the lowest pay a veterinary surgeon draws is Rs. 400 a month, and the minimum salary of the youngest lieutenant in the Indian Staff Corps is Rs. 325, that is, seven or eight rupees a month more than a surgeon-captain of under five years' service.

If we take the cases of surgeon-lieutenants and surgeon captains, what do we find? The former lose in India £30 yearly and when promoted to surgeon-captains lose £50 yearly on the income they would be drawing if serving at home. The following statement should be studied.

English pay and allowances, junior surgeon-captain £24 a month = £288 yearly; surgeon-lieutenant £22 7s. 6d. a month = £268 10s. yearly.

Indian pay consolidated for both ranks under five years' service = Rs. 317 8, with compensation allowance added Rs. 34, which converted into English money at current rate of exchange (say 1s. 2d.) = £237 10s. a year, or £19 15s. 10d. a month, equal to a loss to the surgeon-lieutenant of £31 and to the surgeon-captain of £50 10s. annually.

It is bad enough for young officers to be subjected to the risks of loss of health or death abroad, but when this is associated with no trifling loss of money as well for foreign service, it becomes a decided grievance.

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[3] *Vide* copy of correspondence in leading article in BRITISH MEDICAL

6. Leave for study although strongly recommended by Lord Camperdown's Committee[4] is absolutely unknown, either at home or in India. Medical officers are, therefore, debarred from keeping themselves abreast of the advances in their profession by attending large hospitals and schools at centres of education.

7. Ordinary privilege leave at home and abroad for change and relaxation is never assured owing to the paucity of medical officers, exigencies of sickness, etc. The whittling process at the Medical Department that has for years past been carried out has seriously affected the question of privilege leave.

8. The large disproportion between foreign and home service has seriously affected the health and efficiency of medical officers and added considerably to the non-effective list.

THE MEDICAL SERVICES IN INDIA.

1. Experienced administrative medical officers serving in India hold a strong opinion that the Army Medical Staff and the military portions of the Indian Medical Service should be amalgamated.

2. That the Indian Medical Service should be separated into strictly military and civil branches, and that all educated natives should, after competition, be eligible to the civil branch.

3. The establishment of station hospitals for native troops is a measure well worth consideration. It is a question whether this scheme has ever had a complete and fair trial, that it would relieve the Indian Government of financial strain is almost indisputable. At all events an open discussion on this matter at the Congress is desirable, medical officers of both Army Medical Staff and Indian Medical Service could then put forth their views and a decision might be

come to. The establishment of the station hospital system for British troops in India has saved the Indian Government several lakhs of rupees and cannot be pronounced other than a success.

4. The subject of forming a medical staff corps from the Eurasian community has been ventilated. It appears to be well worth considering.

5. The present Army Hospital Native Corps is thoroughly and acknowledgedly inefficient and useless in peace or war for hospital purposes. The men are badly recruited, indifferently clothed, and totally inadequately paid, and all the defects attending these disadvantages, for example, desertion, indiscipline, and dishonesty, are quite common.[5] The need is that the men of the Army Hospital Native Corps should be placed on a footing with Sepoys as to recruiting, pay, and clothing.

Everything connected with the Army Hospital Native Corps at present is radically defective, and this corps for nursing purposes is avowedly inefficient (absolutely useless). Sir James Hanbury, K.C.B., when Principal Medical Officer in Madras, submitted to the Government of India a feasible and uncomplicated scheme for a proposed Medical Staff Corps for that Presidency, including Burmah. Sir James Hanbury suggested the need of some ten staff-sergeants and sergeants, about nine corporals and some fifty privates, these were intended to supplement the Army Hospital Native Corps. Sir James fully pointed out the defects of the Native Corps and the necessity of placing it on a proper footing.

Those medical officers whose opinions are worth receiving while not in any way decrying the usefulness of lady nurses in cantonment hospitals, affirm strongly that the introduction of the Medical Staff Corps into India is an absolute necessity and by such a procedure only can the sick and wounded of our troops be efficiently looked after in any frontier war where if it now broke out, our soldiers would have no organised nursing.

If the Medical Staff Corps are now sent to serve in China, the Straits, West Indies, Mediterranean, and Egypt what is the obstacle to their despatch for duty in India?

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[5] See *Indian Medical Gazette*, [illegible]

This nursing question should be kept well before the public and more questioning on the subject in Parliament, and ventilation in the press is needed.

It is our duty to effect the proper care of our sick and wounded under conditions both of peace and war.

6. For the thorough and efficient security of potable and other waters in Indian cantonments a bacteriological examiner should be employed by the Government of India. Such an official would make periodical visits to the more important stations and not only carry out his examinations, but make any suggestions relating to his special department. The chemical analysis alone of water is not in these days considered adequate.

The prevention of disease that would follow on this scheme, if carried out, would adequately reimburse the Indian Government for such output as must be imposed on it. The present deaths from enteric fever in the Army are appalling. The Blue Book for 1892 shows that in that year there were in the three Presidencies of India 1,506 admissions from enteric fever with 374 deaths. The general sanitary condition of India will be readily realised when it is stated that during the year 1892 over three-quarters of a million of people died from cholera in the Indian Empire.

THE FUTURE OF THE SCIENCE AND ART OF MEDICINE IN INDIA.

I turn now to subjects free from polemical and personal differences of opinion, to the more engrossing scientific and practical questions which concerns the future of medicine and the welfare of the seething masses of humanity entrusted to your care, and first I must needs say a few words on a quite modern method from which much may be hoped—that of

ANTICHOLERAIC INOCULATIONS.

While European Governments have been dealing with preagainst the introduction of the spread of cholera, another measure of the utmost importance has been steadily developing in India. I refer to the anticholeraic vaccination, as discovered and carried out by M. Haffkine. Worked out by him in Paris, in Pasteur's Laboratory, it has been applied by M. Haffkine to large numbers of people in the North-Western Provinces of India, the Punjab, and Bengal. This work has been attentively watched by the medical world, and the results hitherto obtained, as yet on a limited number of the population, have been very gratifying. There was a question, from the beginning, whether a measure of this kind could be introduced into India and other countries of Asia. It was thought that the customs and conservative spirit to which the East is so deeply faithful would form an insurmountable obstacle to the carrying on of Haffkine's inoculations. It however seems to have been forgotten that the East was the first discoverer of the principle of protective inoculations, and there can be no doubt that Haffkine's operations against cholera answered in a measure to the mode of thought familiar to the Eastern doctrines. The devotion of the Medical Service in India to the welfare of the people has been well illustrated in the manner they welcomed and assisted in the development of this work. In all the localities which M. Haffkine has visited, Hindus, Mahomedans, Europeans, of all classes and sects, have come forward to be inoculated, and in the course of the first year over 25,000 have submitted themselves to him for his operation. Since then these numbers have greatly increased. These results having been accomplished by individual effort, there cannot be any doubt that the measure can be easily extended over large numbers of population when Governments, municipalities, and other communities directly interest themselves in the matter.

Everyone will remember the first observations made by the health officer of Calcutta and the results obtained in Kattal-Bagan bustee (Calcutta), where, out of 200 individuals, 116 have been inoculated, and where cholera breaking out caused 10 cases with 7 deaths among the non-inoculated portion of the inhabitants and left perfectly free the inoculated. This demonstration, in which the larger half of the population underwent the preventive treatment, and the other smaller half remained untreated, conform to the requirements of the strictest scientific methods, and represent as complete an application of them as can be admitted in a free human community. It represents an accomplished laboratory research in the midst of a free general population; but the defects to which this first demonstration has been unavoidably subject, and which lie in the very nature of the things, have been those owing to the impossibility of securing the whole population at the time living under exactly similar conditions of life, general health, and habits.

These observations attracted universal attention when recorded in the well-known report of Dr. W. J. Simpson, the health officer of Calcutta, asking the Calcutta Municipality for the first establishment which, it is hoped, is destined to give permanency to the inoculations in the home of cholera. The Municipality of Calcutta are to be congratulated in the name of science and of humanity on this initiative measure, one of the most important that has been taken for the protection of human life, and which the representatives of this most enlightened capital of the East may be well proud of.

Conditions still more precise than in Kattal-Bagan bustee were soon after obtained in the observations made at the Gaya Gaol, in which a little over a half of the prisoners were inoculated during an outbreak of the disease. The inoculations were done after 6 cases with 5 deaths had occurred, and as they were carried on whilst the epidemic was progressing, and as cases of cholera in the first days occurred amongst the inoculated as well as among the non-inoculated, evidence of the protective influence of the inoculation was taken under striking circumstances. In this case the mode of life, the state of health, age, sex, and chances of infection have been as equally distributed and represented in the inoculated and uninoculated portions of the inhabitants, as may be required in the strictest scientific investigations. The result showed that the protective inoculations in a few days effected in the operated inhabitants a gradually increasing resistance, which became fully manifest when eight days elapsed after the first inoculation. This period of eight days is about the required and civil surgeon of Gaya district, three periods have been observed in the course of the epidemic in the gaol. It happened that during the first five days after the first inoculation there were 7 cases with 5 deaths among the non-inoculated, and 5 cases with 4 deaths among the equal number of inoculated prisoners. During the second period of three days there were 5 cases with 3 deaths among the non-inoculated, and 3 cases with 1 death among the inoculated; and during the third period there were 8 cases with 2 deaths among the non-inoculated, and no cases and no deaths among the inoculated. These results are the more important that they fully answer to what was theoretically foreseen.

These and other observations made since then are in the highest degree favourable to the system, which, we are convinced, will be further modified and improved according to the teaching of experience, and it is to be hoped that in no distant future inoculations against cholera will take, in the East and in all other countries affected by this disease, a position side-by-side with vaccination against small-pox.

THE GERM THEORY OF DISEASE.

At no period in the history of medicine has there been so complete and so rapid a revolution in pathology as in that which has witnessed the rise and general acceptance of the germ theory of disease, a period of only some ten or fifteen years—twenty at the outside. In this short time our ideas of the nature and causes of the great majority of diseases have been completely changed, and, in many particulars, there has been a corresponding change in practice. A large, by far the largest, department of pathology, has now virtually become the study of germs, of their life histories, of their direct effects on the human body, and of the reaction of the human body in their presence. The germ—animal, vegetable, or bacterial—dominates nearly everything medical, in theory and in practice both. What holds good in this respect for temperate climates applies equally well to the tropics, perhaps if anything in a higher degree. It is instructive to find it set forth in such works on tropical disease as those of Sir Ranald Martin, of Morehead, or even in so recent a work as that of Chevers on the *Diseases of India*, published in 1886, with the pathology of the most recent English work on tropical disease—that on the *Hygiene and Diseases of Warm Climates*, edited by Davidson, and published last year. In Morehead (2nd edition, 1860) the nearest approach to a germ is a guinea worm or some gross intestinal parasite; in Davidson's work, with all the diseases discussed therein an ascertained or suspected germ is associated as cause in nearly everyone of them. If you look into the last-mentioned work you will find that the diseases described are arranged into four groups: (1) General diseases, including malarial disease, typhoid, Malta fever, yellow fever, dengue, plague, cholera, leprosy, beri-beri, negro lethargy, and frambœsia. Every one of these is regarded and treated of as a germ disease—as the result of a parasite. (2) Local diseases, including tropical diarrhœa, dysentery, tropical diseases of the liver, tropical liver abscess, sunstroke, goître. How far germs have to do with some of these cannot as yet be laid down with precision, but certainly a large proportion of these diseases are attributable either to the direct influence of special germs, or to the secondary effects of the malaria germ. Goître even is regarded as a germ disease. Sunstroke, alone of them all, is perhaps the only one which is free from this suspicion. (3) Elephantiasis, the elephantoid diseases, and chyluria are frankly placed in the third category—parasitic diseases—meaning by this expression animal parasitic diseases, a term which covers also the large crowd of tropical entozoa, and includes such important conditions as ankylostomiasis, endemic hæmaturia, endemic hæmoptysis, and so forth. (4) And, finally, in this work there is a fourth division—skin diseases—in which a number of affections of the skin, more or less special to the tropics, are discussed. Of these, with three exceptions—prickly heat, keloid, ainhum—all are regarded as parasitic or germ diseases. Even of the three exceptions I mention, only one of them, prickly heat—and there may be a doubt about it even—can with certainty be diseases has resolved itself principally into the study of a series of germs—parasites—and of their effects on the human body, a very small section indeed of tropical diseases being attributable to what may be regarded as purely climatic influences such as heat, light, moisture. These latter conditions may or may not have important predisposing influences as affecting receptivity, but the actual excitors, the actual causes of by far the larger proportion of tropical diseases, are tropical germs. By the way, I must take care to stipulate that when I use the word "tropical," it must not be taken in a geographical but rather in a climatic sense.

Why is it, one may ask—why is it, seeing that disease is so generally attributable to germs, that some should be special to the tropics, others to the temperate zones? The human body is the same pretty much everywhere; the cultivating medium is the same whether it is enclosed in a white skin or in a black skin, and the temperature of the culture is started in all climates at 98.4°, and one would therefore think that the same germs would grow in it everywhere. Apart from such considerations as relate to social and hygienic conditions, there are several reasons for this difference in the distribution of the germs of tropical and those of temperate climates. First, the germs of a certain set of tropical diseases live and multiply outside the human body altogether, and their introduction into the human body is an accident, in some of them an unnecessary and quite superfluous incident in their life-history; or, it may be, they live on the surface of the body. Their nature and successful growth in these situations demand a relatively high temperature and a proportion of moisture such as can be got only in warm climates. Such are the germs of malaria, beri-beri, ankylostomiasis, tinea imbricata. Secondly, the germs of another set of tropical diseases have to pass a certain phase of their existence outside the human body and inside the body of another animal—which is called an intermediate host—and to this second animal a relatively high temperature is a necessary condition for its existence and well-being. The filaria diseases belong to this category; the appropriate species of mosquito—the

There is yet a third class of tropical germ diseases, the reason for whose limitation to the tropics is not yet understood. I refer to dengue and yellow fever. Why is it that these diseases, unlike all the other continued fevers, refuse to spread from man to man in cold climates? Can it be that the germ in its passage from one man to another is killed by temperatures lower than the relatively high temperature of 75°, or is it that the germs of these diseases have to pass a time in some medium outside the human body before they can become infective, and that this medium requires in some way an atmospheric temperature of over 75°? It is curious to note that, conversely, another infectious disease, also one of the exanthematous fevers—scarlet fever, and, perhaps, typhus—will not spread in a warm climate. Can it be that the germ of this disease is killed in its passage from one body to another by a high temperature—one, however, which is only slightly above ordinary summer heat—or has it, too, to pass a phase of its existence—possibly only a very short one—outside the human body before it can become infective, and is it that this phase demands a relatively low temperature? This matter of the conditions which determine the activity of the germs of these three or four diseases will form an interesting subject for investigation when their germs are discovered. This fact of excessive sensibility to temperature suggests that the germs of these diseases are not bacterial.

From what I have said you will understand why it is that in the remarks which I propose to make on tropical diseases, germs and parasites will occupy a very prominent place; for you will understand that I regard the study of tropical disease as being in great measure a study of tropical parasites. In these remarks I shall hope to indicate what I consider promising lines for research, and I shall take the liberty of describing certain methods of investigation which, though probably well known to some of you, may not be familiar to all of you, but which all of you are capable of employing with advantage to the science of medicine, to your patients, and to yourselves. And if I appear to be somewhat presumptuous in my remarks on Indian work and Indian workers, and as attitude, I beg your pardon in advance. I would ask you to remember that as Editor of the BRITISH MEDICAL JOURNAL I enjoy what are perhaps exceptional opportunities of gauging the times, of learning what is being done in things medical all over the world, and of perceiving, perhaps, what is the best thing next to be done. Though in a sense an outsider in Indian medical matters I am by no means an indifferent spectator.

THE MALARIA PARASITE.

Of the two greatest discoveries of recent times in pathology—the parasite of tubercle and the parasite of malaria—it is difficult to say which is the more important. Certainly as regards India and tropical countries in general, the more important is the discovery of the malaria parasite. It is hardly necessary to insist on this to an Indian audience, for the fact is only too patent that a very large proportion of the mortality and a still larger proportion of the morbidity of India are directly or indirectly attributable to malaria.

Seeing this, it is a somewhat strange circumstance that, although we have been acquainted with this parasite now for some fourteen years, and although many pathologists in Italy, in France, in Germany, and in America have occupied themselves with its study, it has been entirely, or almost entirely, neglected by the profession in India and England. At all events, if they have not entirely neglected the subject, it cannot be said that they have added any important fact to our stock of knowledge about it.

One name certainly stands out a prominent exception in this, as it has done in many other departments of Indian pathology—that of Vandyke Carter. But with this exception I cannot say that our Indian brethren have done their share in this work—work which so specially concerns them, and for the prosecution of which they enjoy opportunities so exceptional. Even Carter's investigations are more valuable as confirmatory of Laveran's than as adding to them.

True, there have been other workers and writers in India who have concerned themselves with the malaria parasite:

hard to follow, that they can hardly be regarded as advancing the subject. In not a few instances they evidently refer to what are merely *post-mortem* changes in the normal elements of the blood, and certainly not to the malaria parasite. The publication of these observations has perhaps done more harm than good; for, as a consequence, we now find in India, in addition to those believers in the malaria parasite having a genuine and well-founded belief, two classes of individuals with diametrically opposite opinions about this germ; and of these two classes, although they are of opposite opinions, neither of them is correct. Thus we have those who do believe in the malaria parasite, but who found their belief on false data, namely, on the normal *post-mortem* appearances alluded to, and which they have wrongly interpreted; and we have those who, recognising the true nature of the *post-mortem* appearances which some of their colleagues mistake for the malaria parasite, have, in consequence, become sceptical as to the existence of any such parasite whatever, regarding all observations in this connection of a positive character as equally fallacious and unreliable.

Now, neither one nor the other is correct. These *post-mortem* appearances are certainly not the malaria parasite, and do not justify a belief in the existence of such a parasite; and the scepticism of the sceptics is equally unjustified, founded as it is on the same faulty observations.

Before we can look for assistance from India in the furtherance of this study, these opposing and equally fallacious views must be got rid of, and a fresh start made on a sounder basis, on sounder observations.

If there is one thing certain in pathology, it is that a living parasite is present and can be found—practically invariably—in malarial blood. This is the creed of everyone who has worked at the subject on sound lines. One reason for the scepticism on the subject which is so common among the members of the profession is the difficulty experienced in finding the parasite. *Difficulty* is hardly the right expression; rather, I should have said *ignorance* of the methods which should be followed to demonstrate the parasite. It seems ungenerous to blame Laveran, to whom we owe so much, for this. Still we must for this ignorance and the prevailing scepticism. Laveran, though a great pathologist and a great discoverer, has, in this particular instance, proved himself a poor teacher. A good teacher studies his pupils as well as his subject. He studies their capacities and takes into account their previous training. Laveran has not done this. The fact is he has not realised how stupid and ignorant we, his pupils, are. For, although he indicated a way of demonstrating the malaria parasite, his description of his methods was brief, and the principle on which his method depended was not sufficiently accentuated, and it loses much of its value inasmuch as it takes no account of our incapacity and clumsiness, and of our want of familiarity with blood microscopical *technique.* Had Laveran recognised our ignorance, had he described fully and carefully, and reiterated his *technique* over and over again, printed it in capital letters on every page of his earlier work, had he succeeded in thoroughly educating his public in his methods of demonstration, his followers in India and elsewhere, instead of numbering, as they do to-day, some paltry tens or hundreds, would by this time have been reckoned by thousands. And Laveran's example in this respect has been followed by nearly all writers on the subject of the malaria parasite. The thing is so simple and self-evident to them—after they have done it—that they apparently assume as a matter of course that everyone must know how to set about the demonstration, and without special instruction. Now this is far from being the case; so much so that he who should succeed in impressing upon the profession a knowledge of the proper method of demonstrating this parasite will confer a great boon on medical science. He will at once multiply enormously the number of observers and also of believers; for whoever employs the right method cannot fail with a little patience and a fairly good microscope to see nearly at once and in every case of malarial fever the object he is in search of, and become himself a convert to the existence of the malaria parasite, a believer in its far-reaching importance, in its great *rôle;* and, in addition to this, he will become an investigator and a valuable apostle of the new pathology.

tropical pathology. Everyone, therefore, practising in the tropics must familiarise himself with its appearance, and with the way to demonstrate it. This is a manifest duty. It can be shown in the blood of every ague patient, in the blood of every malarial remittent which has not been treated with quinine. This point of demonstration is therefore so fundamental, so important, that I feel I shall have accomplished something worth doing if I succeed in impressing it thoroughly on my audience. Feeling this I entertain the hope that my presumption will not be taken amiss, and that it may help someone in his search if I indicate briefly the best method of demonstration. Should I succeed in this, I would strongly advise those of you who have not already seen this parasite, particularly every sceptic, having thoroughly grasped the principle of the method, to set to work on the first case of well-marked, untreated ague you come across, and never to rest in your search until you have found it.

A slide of blood as ordinarily prepared shows the blood aggregated in rouleaux, the corpuscles closely approximated, and presenting their edges only to the eye of the observer. Now, in blood slides so prepared, it is simply impossible to perceive the usual and most common forms of the malaria parasite; as impossible as it would be to see the Empress's head on the individual coins piled one on top of the other, constituting a roll of rupees. If you wish to see the stamp on the coins you must spread them out flat on their faces, so to speak. It is exactly the same with the malaria parasite in the blood corpuscle as it is with the Empress's head on the coin. The parasite is inside the body of the corpuscle not on its edge, rarely outside of it, so that to see it you must dispose the blood corpuscles as you would the coins—you must lay them flat on their faces. Whoever would see the malaria parasite must remember this as a prime and elementary fact; his *technique* must be directed to secure this disposition of corpuscles. If he succeed in this his difficulties are practically at an end. This is the whole secret and principle of malaria blood examination. It is so evident, so simple, that it almost seems necessary that I should apologise to you for mentioning it; nevertheless, like many another very evident and simple matter, and just for this very reason, it has been very generally overlooked.

To secure preparations of blood showing the corpuscles lying flat on their faces proceed in this way. Wash cover-glass and slip in alcohol or ether. Make them thoroughly clean and dry. Wash the finger of the patient with soap and water, afterwards, if necessary, with ether and dry it. Ligature the finger and prick it in the usual way, but prick it very lightly; this is important—prick it very lightly; a big drop of blood is a snare. Wipe the first drop of blood which exudes away, then gently press the pad of the finger between finger and thumb, and, as soon as a droplet of blood no bigger than a pin's head has appeared, take this up by touching its apex—if I may use the expression—lightly with the centre of the cover-glass. Then drop the cover-glass on the slip. If finger, cover-glass, and slip are thoroughly clean and dry, and the operation has been rightly and quickly performed, the blood will run out in an exceedingly delicate film in which, after a minute or two, all the blood corpuscles will be found lying flat on their faces. Best make six such preparations at a sitting, for some are sure to be failures, having the corpuscles in rouleaux or imperfectly disposed and isolated.

Over imperfect preparations no time should be lost; they are mostly useless. Select only the best slides and search them with a twelfth immersion lens in a fairly good but not too bright illumination. If the blood-giver is suffering from an access of malarial fever, or is about to suffer from malarial fever, and if he has not been taking quinine recently, with a little patience you are now sure to see what you are in search of. You may have to search many fields and to spend some time, but persevere; the parasite is certainly on your slides.

At first there may be some difficulty in recognising the plasmodium—as it is conveniently but somewhat inaccurately termed. Once seen it will not be forgotten; ever afterwards you will have no difficulty in telling whether a given specimen of blood so prepared is malarial or not.

Look in your slides for ill-defined, palish, nebulous bodies inside blood corpuscles. These palish bodies may be mere specks, or they may occupy a fourth, or a half or nearly the whole of a corpuscle. The black pigment particles attract the attention most readily. If you see such a particle or cluster of black particles in a corpuscle focus carefully, scrutinise carefully; see if they lie in a pale, ill-defined body; look for changes in the position of the particles and for alterations in the shape of the pale substance in which these are imbedded; in other words, look for evidences of life in this intra-corpuscular body. In some slides you may find one, or two, or many such intra-corpuscular bodies in every field; in other slides, and generally you will have to search many fields before you find one.

Recollect always that you must have your corpuscles lying flat, each of them isolated. Recollect that it may be only in one corpuscle out of many hundreds or thousands of healthy corpuscles that you will find a parasite. Recollect, let me repeat, that in the first instance you should look for specks of black pigment lying inside some of the corpuscles, one in perhaps every two, three, four, or perhaps fifty fields. Recollect that this pigment lies within the pale, nebulous, ill-defined body whose living nature is manifested by slow, or more or less rapid, changes of shape. Recollect that this body may be only a mere speck in the corpuscle, or that it may occupy a fourth, a half, or nearly the entire disc. Find such a body and you have found the usual form of the plasmodium malariæ. And when you have seen and recognised it, those of you who have hitherto worked unsuccessfully at the subject will be astonished that you failed to find the parasite before. You will be astonished that medical science had to wait till the end of the nineteenth century before discovering it. I have known men who worked for months on malarial blood diligently, carefully, and on every opportunity, and yet, simply because they did not follow the proper principle in preparing their slides, did not quite realise what they had to search for, they failed completely to see the parasite, and gave up the search in disgust, perhaps became sceptics. Recollect that you may actually see the parasite and not recognise it. Recollect that eyes sharp and trained as those of Virchow and Frerichs, although they undoubtedly saw the plasmodium, described phases of it in fact, completely failed to recognise it, to accept the discovery they had actually made, and which was lying patent under their very noses. Sometimes you must know what you look for before you can perceive it.

The rarer forms of the parasite, the crescents and flagellated bodies. are easily made out when encountered. But do not mistake artificially produced rents and vacuoles in the corpuscles for intra-corpuscular bodies, as has been so often done ; buckled up corpuscles for crescents ; or a stellate arrangement of the fibrin for the flagellated body ; or blood plates for spores, or clustered blood plates for the sporulating forms. If ever in doubt about the nature of some body you see under the microscope, depend upon it it is not the malaria parasite. Look with suspicion on every body not carrying pigment.* The crescent is a pale body with black pigment about its centre ; the buckled corpuscle is crescent shaped too, it is true, but it is hæmoglobin coloured, and carries no black pigment. If you see any movement in a limited part of the field, any sudden quivering, trembling, or sudden change of shape in the blood corpuscles, look carefully for the cause of this disturbance ; most likely it is produced by the flagella of a flagellated body lying in close proximity to the agitated corpuscles. The body of this flagellated organism, the sphere to which the flagella are attached, is full of pigment in very active movement and cannot be mistaken. Do not expect to see these flagellated bodies often, or the crescents often ; but expect to see the intra-corpuscular bodies—large or small—in every case of malarial fever.

I have no intention of entering on a detailed description of this parasite, or of discussing the many important questions connected with it. All this you can find in the latest publications of the New Sydenham Society, in their translation of Laveran's last work, in their translation of Marchiafava and Bignami's conjoint work on the *Summer-Autumn Fevers of Rome*, and in their translation of Mannaberg's elaborate and most excellent monograph on the *Malaria Parasite*. These books you must study exhaustively.

upon you its enormous importance,; to impress on you the fact that the malaria parasite is no myth but a reality; to point out more plainly than is done in the books referred to and in other works on the subject the way to set about finding it; to make clear to you that it is easily found, and by very simple means, if the search is gone about in the simple, right way; to remind you that you of the profession in India have a duty in this matter, and to appeal to you to do something for the scientific reputation of our country. I do not ask you to enter on a dry and uninteresting task. I feel sure that whoever has once seen the malaria parasite will return spontaneously and whenever he can to its study. The thing is so marvellous, so important, so fascinating in itself that anyone who has tasted the pleasures of the investigation will be sure to take every opportunity of renewing them.

Do not be deterred by assumed incompetence or imaginary difficulties. Many suppose that microscopical examinations and scientific work in general cannot be efficiently conducted by men circumstanced as I presume the majority of Indian medical officers are, having only limited apparatus, without command of a large library, without abundant leisure. Those who suppose this debar themselves from much pleasure, much usefulness. It is a great mistake. The best work is nearly invariably done with the smallest amount of apparatus, often apparatus of the crudest description, away from libraries, and in the scanty leisure of active practice. The best apparatus is in a man's head and in his will. In scientific research, next to a clear perception of what you would seek and persistency of effort, simplicity and directness of method are the surest guarantees of success. Great truths generally lie under our eyes could we but look clearly, simply; think clearly, truthfully, simply; and not smother ourselves in all sorts of preconceived ideas, in cant, in untruthfulness, in paraphernalia, and in the prevailing fashion.

For example, in this matter of the malaria parasite the question is what is the best stain for it. Now, why on earth should we stain it? It is perfectly visible without being stained. The idea is evidently that some sort of artificial staining and preparation of the blood are necessary sort of "open sesame" ceremonial must be gone through in every microscopical performance; that the raw material must be submitted to some elaborate process before the germ it contains has a right to be visible—dipping it in this fluid, dipping it in that fluid. sterilising, and cultivating, and putting it through no end of complicated bacteriological gymnastics. Staining and similar modern histological methods are of great use for certain purposes, but not for every purpose. The tendency is to overdo them, to apply them to every purpose. Nowadays many histologists would rather contemplate a hardened, stained, artificial tissue than a tissue in its natural condition. The ends of microscopical investigations are too often forgotten in the means, too often in this way never attained. Consequently, many important facts in histology and pathology are overlooked, simply because histologists, wedded to methods and fashions, fancy that such processes are necessary, and so lose themselves in their methods. Too often in carrying out these methods they destroy one of the best aids in such investigations as the one we concern ourselves with at present; they destroy life and that important evidence of life, movement. To see the malaria parasite none of these elaborate processes of preparation are required, are even desirable. You examine fresh blood—fluid blood, not dried and stained blood. Laveran's discoveries were made with unstained preparations, with fresh blood. His entire apparatus consisted of a needle and a string, a slip and cover-glass, and a microscope with a magnifying power of some 400 or 500 diameters; yet with this despicable microscopical outfit he made his great discovery, and his descriptions of the histological features of the malaria parasite are still, perhaps, the best we have.

The history of the discovery of this same malaria parasite is an excellent illustration of what I urge with regard to simplicity and directness in scientific work. About the same time that Laveran was pursuing his investigations Marchiafava was also working on malaria blood. Marchiafava was bitten by the modern mania for drying blood, passing it through the flame, staining, cultivating, mounting in balsam, and so forth, and the consequence was that, although he actually saw the malaria parasite times without number, yet in consequence of his manipulations of the blood he missed the significance of what he saw. He killed the parasites, and he called and regarded their corpses as "degenerated hæmoglobin." Laveran simply looked at fresh unmanipulated blood, and observed his parasites in their living state. Consequently he saw their movements, and his simplicity was rewarded by a great discovery. The flagellated organism, the finding of which was the key to Laveran's discovery, is not recognisable in dried and stained slides. Staining methods are of use in working out a few of the details of the malaria parasite. They can prove that it is an independent organism, as by their means the nucleus and nucleolus of the animal are rendered visible; to this extent they are of use, but further than this they cannot be said to have any value whatever. Had such means only been employed very likely the plasmodium would never have been discovered. I would therefore advise anyone who would engage in this investigation to leave staining and artificial preparation of blood alone, at all events until he has thoroughly familiarised himself with the appearances and characters of the living malaria parasite in fresh blood; above all, to cultivate simplicity in his methods.

Until lately malaria has been studied only in its effects; henceforth the study will embrace—and that in the first instance—its cause. When the next textbook on tropical medicine comes to be written the chapters on malaria disease will be written from the standpoint of the malaria parasite. The first chapter will be a piece of natural history—the life-history of the parasite. When this has been fully set forth, then, and not till then, the writer will pass to the consideration of the action of the parasite on its human host, that is, to malarial disease. This is scientific medicine. Hitherto as regards malaria it has been as with astronomy before the laws of gravity were discovered. Laveran by his discovery has proved himself a medical Newton. The old touchstones of malaria—quinine and periodicity—were extremely unsatisfactory and fallible as a basis for scientific study; the thing malaria itself—the germ—is infallible. Thanks to Laveran we can now see the thing itself, and the subject has thus passed at one bound from the region of empiricism to the region of science.

When the Indian observer has satisfied himself of the existence of the malaria organism; when he has learnt to recognise its various phases and their relation to each other; when he has become so familiar with them that he can apply his knowledge with confidence to diagnosis; then he should endeavour, so far as lies in his power, to apply his knowledge to the reinvestigation of the entire range of Indian fevers. Recently the BRITISH MEDICAL JOURNAL published a malarial chart, which, in its present form, or in a form modified by further experience, it is hoped, will prove of service in such investigations. It enables observations on the plasmodium in the blood to be rapidly recorded and read, and this in comparison and in conjunction with the progress of the fever as indicated by thermometer.

Whether there is only one malaria parasite whose disease-producing properties are modified by changes of temperature, moisture, soil, or whether there are several parasites closely resembling each other, but still specifically distinct, we cannot as yet say. The settlement of this and of many another knotty point about malaria is bound to come soon. It is *your* duty to tackle these knotty points. European science, knowing your opportunities, expects this of you. I hope that when the successes of the future do come many of them will be scored to British names. I hope these names will not, as hitherto in this matter, be conspicuous by their absence. England has done much for tropical medicine in the past; do not let her lose the place she has gained. Certainly an active investigation of Indian fevers from the standpoint of the new departure is imperatively demanded of the profession in India.

Besides forwarding our knowledge of malaria, good will come of such an investigation in many other and unexpected ways. I have not the slightest doubt that, apart from the malaria question, the systematic examination of the blood in India will result in important discoveries in other departments of tropical pathology. Certainly many fevers now regarded as malarial will be relegated to another class or other classes. There will be many strange and probably useful additions to our knowledge of the fauna and flora of the blood. Diagnosis will become more precise, and consequently treatment more successful, and in a hundred other ways the theory and practice of medicine in the tropics will be advanced.

There is one direction in which in India you could make important contributions to malarial pathology. The discovery by Danilewsky, Grassi, Feletti, and others of organisms closely resembling that of malaria in the blood of the lower animals is not only interesting in itself but is likely to prove of extreme value in elucidating the life-history of the malaria organism of man.

Comparative pathology should in this instance, if vigorously followed up, prove a powerful aid to human pathology. A systematic examination of the blood of the Indian fauna should, therefore, go hand in hand with the systematic examination of the human blood. It is probable that it will be in this way, by the study of the malaria-like parasites in the blood of the lower animals, that the life-history of the malaria parasite of man will be worked out. The investigation into Surra disease and the Surra micro-organism, at present so ably conducted by Lingard, cannot fail to react favourably on human pathology, particularly on this malaria question. As a general rule I am not an advocate for Government aid or patronage in such matters; but the mention of this Surra investigation leads me to think that, if properly approached, a Government which is so thoughtful about the diseases of its beasts of burden might be found to be equally thoughtful about its human subjects and their diseases, and might be induced to aid in some way in their investigation.

This question of malaria is a fascinating subject, and I would fain pursue it further did time permit. Before leaving it I would congratulate the profession in India on having so splendid an opportunity for original work of the most important and attractive description. I sincerely trust that for he honour of British medicine it will not be slow to avail itself of its opportunities.

THE FILARIA SANGUINIS AND FILARIA DISEASE.

While on the subject of blood parasites, I would say a few words about one which, although its study practically commenced in India, has, nevertheless, not received here—at all events of late years—that attention its importance demands.

With the exception of Maitland, of Madras, since Lewis's time no strictly Indian observer, so far as I know, has done much to advance our knowledge of filaria sanguinis, now usually called filaria nocturna. Yet there are many important problems in connection with this parasite still to be settled. Its life-history, it is true, may be said to be fairly well made out; although even as regards this, there are still one or two gaps to be filled in, a good many observations to be confirmed, and a good many of the conclusions about it still lack the test of experiment. But if we may with some show of reason claim that our knowledge of the life-history of the filaria is fairly complete, we must admit that its *rôle* in pathology requires further elucidation. It is astonishing that no one in India has taken up Manson's work; long ere this it ought to have been confuted or confirmed, and, if the latter, extended.

There can be no doubt of the etiological relationship of the filaria to chyluria and to different forms of acquired lymphatic varix. This is thoroughly established. In genuine elephantiasis arabum, however, although the evidence for the etiological relationship of the filaria to the disease is very strong indeed, it cannot be said that it is absolutely conclusive. Any existing doubt on this point might easily be, and ought to be, definitely cleared up in India. This is another of the duties you in India owe to the profession.

Then, as regards the particular mechanism by which the filaria produces its pathological effects, there is a great absence of such direct evidence as *post-mortem* examinations can alone supply. Opportunities for such examinations in filariated subjects must be of daily occurrence in Indian hospitals. Why are they not utilised? Strange to say, we indebted to India for the record of a single instance of thorough *post-mortem* examination of a case of chyluria, or of a case of filarial varix, or even of a case of elephantiasis. The only *post-mortems* of such cases of which we have fairly full reports have been made in England, in France, in Germany, and in Réunion. Good dissections of the lymphatics in filarial disease are therefore still a desideratum, and you in India ought to supply them.

Although the fact itself has been known for many years, we are still without an explanation of the cause of that singular phenomenon, "filarial periodicity." What becomes of the embryo filaria during its daily absences from the blood? This could surely be ascertained by *post-mortem* or experimental examination in such countries as India, where *post-mortems* are obtainable and material is abundant. Apart from its special interest as bearing on the filaria itself, the explanation of filarial periodicity is well worth searching for. It strikes me it covers some important, and perhaps as yet unrecognised, physiological principle, to the investigation of which the coming and going of the filaria in the blood might serve as a guide and index.

A particular species of mosquito has been shown to act as the intermediate host of the filaria in China, and Lewis confirmed this observation to some extent in India. The species of mosquito subserving this function in India has still to be determined. There may be only one efficient intermediate host or there may be many. This ought to be definitely ascertained.

It has often occurred to me that it would be no very difficult matter to construct what I might call a "filaria map" of India, that is to say, a map which would indicate the distribution of this parasite in the native population. Such a map, combined with a similar map showing the distribution of elephantiasis, would be a valuable aid in determining the relationship of the parasite to the disease. I do not think that the systematic examination of the blood of a sufficient number of representatives of the population of the various districts of India, implied in the construction of such a map, would prove a very onerous or difficult task. It would suffice if the blood, say, of a hundred indiscriminately selected natives from each pathological district were examined. Both day and night blood should be sampled. Such examinations can be carried out rapidly and efficiently by simply spreading a drop of blood in a fairly thin film on a glass side, allowing it to dry, and then immersing it, at your convenience, in a weak watery solution of fuchsin. The fuchsin stains the filariæ and the water of the staining solution decolorises the red blood corpuscles; the filariæ are, therefore, easily picked out with a magnifying power of eighty or a hundred diameters, or much less. Fifty such slides could be stained and examined at a time without much fatigue; two or three hours would suffice. The microscopical examination of the samples of representative bloods from all parts of India might thus be made by two or three zealous men in a very short time. To them blood slides collected in the different districts by the medical officers or their native assistants could be sent. Blood prepared in this way is not suitable, it is true, for the study of the anatomy and habits of the filaria, but it is very suitable for simply ascertaining its presence or its absence in any given individual, and, in most instances, for diagnosis of species. Should it be found impossible or impracticable to carry through so extensive an investigatien as the one I indicate, surely it would be at least possible to examine systematically the blood of a small proportion of the inhabitants of those districts in which elephantiasis is endemic.

From such an investigation, the initiation of which is well worth the attention of this Congress, and the successful carrying out of which would be a permanent monument to its usefulness, much precise information could not fail to accrue.

It would be well to warn intending investigators of the fact that the filaria is not usually found in the blood or tissues in developed elephantiasis. It would appear that the development of the disease brings about in some way the destruction of the parasite which produced it. This absence of filariæ in the blood in elephantiasis has proved a stumbling block to many. Properly interpreted, however, it is a powerful argument for the filarial origin of this disease, as well as an indication of the way in which the parasite brings it about.

In addition to eliciting the facts as regards filaria nocturna, it is more than probable that a systematic examination of blood, such as that proposed, would reveal to us that in India, as in Africa, the human blood is the *habitat* of more than one species of nematode embryo. We now know for certain that there are at least three species of human bloodworm, probably five; how many more it is hard to say. In view of this fact it becomes of importance, as affecting diagnosis, that the zoological characters of every embryo filaria found in the blood be accurately laid down, and every effort be made to determine the anatomical features of such specimens of their adult forms as may be found from time to time.

Similar investigations on the blood of the lower animals, particularly of birds, would assist us very much in comprehending and working out yet more thoroughly the history and pathology of the human bloodworms. You are aware that the circulation of many of the lower animals is beset with such parasites. Unfortunately their study has been very much neglected, in fact, has hardly been begun.

Here, again, in filariasis, is another splendid opportunity for the investigator in India. It is a field full of novelty, strange surprises, and, doubtless, much good practical fruit. It is astonishing that it has not been worked long ago. Here, too, simplicity and directness of method are demanded. A microscope of no great power, and a few slides and cover-glasses is all the apparatus required or desirable. If manipulation and staining of blood are employed, it must only be as an accessory to simple, direct observation of fresh blood. To demonstrate one of the most curious biological phenomena in Nature—filarial ecdysis, the casting of its sheath by the filaria—all the apparatus necessary, in addition to the microscope, is a lump of ice. Men must not debar themselves from such work by the idea that it is complicated and difficult. A little patience, a little knowledge, a little thought, and a very little apparatus and manual dexterity suffice.

So far small progress has been made in the treatment of filariasis. Maitland has recently advocated the excision of filarial glands. The results of this treatment should be accurately followed up, and its value ascertained; this point deserves the attention of the Congress. The prevention of filariasis—a very simple matter—should be urged on public attention by the profession in India.

For what is known about most of the human bloodworms I would refer you to Davidson's *Hygiene and Diseases of Warm Climates*, in which will be found a sufficiently full account of the subject.

RECENT INVESTIGATIONS OF GUINEA-WORM.

The guinea-worm is another instance of an important parasite whose study, although practically originating in India, has, with the exception of some interesting observations by Charles, been virtually abandoned by the present generation of Indian medical men. If you hunt through the *Transactions* of the earlier medical societies of India, you will see how energetically this subject was pursued by your predecessors. Unfortunately, in those early days helminthology was in a very backward state—perhaps a despised science; otherwise, these your predecessors, such was their diligence, would have settled long ago many of the interesting and practically very important problems this parasite presents, and which are at present so neglected in India.

Why was it left to a Russian, Fedschenko—all honour to him—to find out that cyclops was the intermediate host of the guinea-worm? Why was this not done in India, where medical men and where material are so plentiful? Why have the Russian naturalist's results not been at least confirmed or refuted, and his experiments extended in India? So far as limited opportunities have permitted some of Fedschenko's observations have been repeated in England, and much of what he affirms about the life-history of guinea-worm has been confirmed there; but this might have been done much better and more fully in India.

Would you repeat a very easy but a very interesting experiment which Manson tells me he has recently carried out in London? In the next guinea-worm case you come across, and in which the parasite is still intact, or in which the head end of the worm has been broken off close to the little hole in the skin, and in which the track of the worm is not suppurating, squeeze from a sponge a tiny stream of cold water on to the patient's leg, causing the water to fall on to the leg about two inches from the ulcer, and being careful that the water does not flow over the ulcer. While the water falls on the leg watch the guinea-worm hole in the centre of the ulcer. In a few seconds you will see this hole fill up with a whitish fluid which, for a second or two, will continue to well up over the sore. Collect this fluid in a watch glass or test tube, and mix it with a little water. Now place a drop of the mixture under the microscope, under a low power. It will be seen to be a seething mass of wriggling guinea-worm embryos. Now go to the nearest pool of stagnant water in which cyclops is to be found. Set a native to catch a few; a rupee will buy any number. Bring them home and put them in a wide-mouthed two-ounce bottle, and place along with them some —not too many—of the young guinea-worms you have collected. If you introduce too many guinea-worms they will kill your cyclops. Six or eight hours later remove with a pipette one of the cyclops—you can easily see them swimming about in the bottle—and place it under the microscope under a cover-glass very thin and light, so as not to crush its delicate body. You will now perceive that many guinea-worm embryos, three or four, or perhaps as many as twenty or more, have entered the cyclops, and are coiled up and wriggling about inside the body cavity of the little crustacean. Lightly press the cover-glass, and you will burst the cyclops and liberate the guinea-worms still alive. Place your bottle of cyclops on your desk. Keep it supplied with water. Pick out a cyclops every few days and examine it. You will thus, and at very little trouble, be able to follow for yourselves the metamorphosis Fedschenko described, and get an insight into the wonders of helminthology such as you will not readily forget.

Do not stop here. Try to filariate with your embryo-charged cyclops dogs, horses, cattle, monkeys—yourself, if you like, it will not hurt you much. Administer by the mouth the larva-charged entomostracians when the filariæ they contain have reached in from five to six weeks the limit of this stage of their development. Fedschenko failed to trace the filaria beyond the cyclops. You may succeed, and thus add an important fact to science. Perhaps it requires a second or even a third intermediate host. You may determine this.

Here, again, there is no need for elaborate apparatus. A wide mouthed bottle, a slide or two, and a three-guinea microscope is all the apparatus required; these, and a little patience.

The treatment of guinea-worm is a subject requiring reconsideration. It is manifest that the time-honoured plan of rolling out the worm on a piece of wood, without regard to particular stage in development she may have attained, is unphysiological and dangerous. Probably leaving the parasite alone until she has emptied her uterus spontaneously, and then, but not till then, winding her out if necessary, is the right method of treating guinea-worm. The plan recently described in the BRITISH MEDICAL JOURNAL of killing the worm by a hypodermic injection of bichloride of mercury solution is worth a thorough trial. This very practical point, the treatment of guinea-worm, should be settled at once. There surely can be no great difficulty about this. It is singular how men have gone on, year after year, century after century in fact, treading in each other's false footsteps in the management of so gross and palpable a disease as this. Little wonder some sneer when the expression "medical science" is used.

DYSENTERY; LIVER ABSCESS; AMŒBA COLI.

Among tropical diseases, particularly as affecting Europeans, next in importance to malarial disease and cholera we must rank dysentery or, more correctly, the group of diseases of which colitis is a principal and the most frequent pathological expression, a group which also includes abscess of the liver. A little light is beginning to dawn on these conditions; we are still, however, far from an accurate appreciation of their etiology, of their inter-relationships, and of their exact nature.

The subject is far too wide for me to do more than glance at one or two of the many unsolved problems with which it bristles. It is interesting to note that slowly—some would say surely—opinion is veering towards recognising it as a fact that liver abscess is in some way invariably preceded, accompanied, succeeded, or otherwise intimately related to dysentery. Of course I refer to tropical liver abscess, or what is known as such. It would, perhaps, as yet be rash to affirm that all liver abscesses are due to ulceration of the colon—are a consequence of dysenteric ulceration of the colon; but the association of liver abscess with dysentery is so frequent that there is quite as strong statistical evidence for regarding liver abscess as, at all events, a frequent pathological concomitant of dysentery, as there is for regarding endocarditis as a frequent pathological concomitant of rheumatic inflammation of the joints. It is a very suggestive circumstance that the more carefully cases of liver abscess are studied, and the more critically the recorded cases of liver abscess are analysed, the fewer seem to be the cases of which it can be asserted with confidence that the abscess of the liver was independent of dysentery.

We cannot be surprised, therefore, that a large section of pathologists have—perhaps somewhat prematurely, I do not say wrongly—concluded that the cause, the only cause, of liver abscess is dysentery. There are many, however, particularly in India, who energetically dissent from such a generalisation. And even among the ranks of those who take this view there is by no means unanimity as to the exact way in which dysentery gives rise to liver abscess. This is a question of great practical and scientific moment, to the settlement of which this Congress might powerfully contribute.

It may be of use if I enumerate some of the views entertained at the present day on this subject. Many writers shirk a definite formulation of their opinions; others express them very loosely; and there is too often a very illogical mixing up of cause, effect, and concomitance in works on this and cognate subjects. The following enumeration contains all the more important expressions of opinion I can think of:

1. There is only one kind of liver abscess—that resulting

rom absorption of pyogenic organisms from an ulcerated colon.

2. There is only one kind of liver abscess—that resulting from the corroding effects on the liver tissue of septic fluids absorbed from dysenteric surfaces.

3. There is only one kind of liver abscess—that resulting from the direct operation on the liver of an unknown cause which also gives rise to, or may not give rise to, dysentery. The liver abscess in this case being regarded as a concomitant merely of the dysentery; the relationship being comparable to that of the endocarditis to the inflammation of joints in rheumatic fever.

4. The principal and a necessary cause of liver abscess in the tropics is the predisposing one—one which is essentially physio-pathological in its nature. The resisting power of the liver to pyogenic and necrotic influences is impaired by physio-pathological changes in the gland the result of high atmospheric temperature, malarial, and other ill-defined tropical influences. In an organ so prepared morbid influences which would not seriously affect a healthy gland excite suppuration.

5. There are two kinds of liver abscess: (*a*) one resulting from septic absorption from ulcerated colon, (*b*) one from a climatic idiopathic hepatitis quite independent of colitis.

6. There are two kinds of liver abscess: (*a*) one resulting from septic absorption from dysenteric colon, (*b*) one from proliferation of amœba coli derived from ulcerated colon.

7. There are three kinds of liver abscess: (*a*) the idiopathic, arising from various morbid excitants operating on a climatically predisposed liver, (*b*) septic dysenteric, (*c*) amœbic dysenteric.

Which of these views is correct, or if any of them be correct, it is hard to pronounce with certainty. Much work has been expended in the attempt to arrive at precision in the matter; more has to be expended before any or all of these views have either been proved or disproved.

Then there is another point calling for settlement. Admitting, as we must, the inter-relationship of liver abscess and dysentery, but remembering that liver abscess rarely accompanies or follows dysentery in cold climates, that it is more common in connection with the dysentery of certain districts in warm climates than in connection with that of other districts, and that it appears more frequently in certain epidemics of dysentery than in others, the question arises:—Are not these apparent anomalies to be explained by the supposition that there are several kinds or species of dysentery, all of which are not etiologically in relationship with liver abscess? This, too, is another matter well worth the consideration of this Congress.

To pass to another subject. The earlier writers, and even some modern writers, as you are doubtless aware, classify liver abscesses into two categories: Single abscess—which they designate tropical, and multiple abscess—which they designate dysenteric abscess, sometimes secondary abscess, sometimes pyæmic abscess. I should like to know why the multiple abscess should not be called tropical abscess as well as the single abscess is called tropical abscess, and why the single abscess is not called secondary or dysenteric abscess as well as the multiple abscess. Both forms occur in the tropics and both occur in connection with dysentery. We hear of cases of "tropical abscess" of the liver in which two, three, four, or more abscesses were found; and we hear of cases designated "secondary abscess" of the liver in which there may have been only some four, five, or six abscesses. I should like to know what number of abscesses disqualifies a given case from being regarded as tropical liver abscess, and what number of abscesses qualifies it for being regarded as a multiple, dysenteric, or secondary case. There is surely some false doctrine as well as much confusion of idea at the bottom of this classification of liver abscesses. I myself believe that the multiple and the single abscesses are, pathologically, the same disease. They both occur in the tropics, and are generally associated with dysentery—as I have said; and they are both macroscopically and, so far as I know, microscopically identical in physical characters. I believe an artificial distinction has crept in here, where there is no real difference—probably inspired by the desire to make facts tally with the catching pyæmic doctrine of multiple various merely numerically different forms of abscess should be expunged—at all events, suspended—until it is proved that there is a real—not merely a supposed—difference.

The whole question of the relationship of dysentery to liver abscess requires restudying; and when this restudy is undertaken very much greater care will have to be exercised in observation and in description than has hitherto been the rule. Kelsch and Kiener in their *Maladies des Pays Chauds* discuss the point very judiciously. Dr. Neil Macleod also, in recent numbers of the BRITISH MEDICAL JOURNAL, handles the matter with much critical acumen. Dr. Macleod, as do the French authorities referred to, shows how frequently in liver abscess—nay, how almost invariably, when the records of the clinical histories or of the *post-mortem* examinations are properly scrutinised, alvine flux on the one hand and evidence of existing or past ulceration of the colon on the other is to be found. They show also how often it happens in medical literature that when liver abscess is recorded as occurring without dysentery the narrative of the case or the *post-mortem* examination of the colon has been imperfectly detailed. And in balancing evidence on this subject, it must be borne in mind that extensive ulceration of the colon may occur and heal, and yet alvine flux may at no time have been a feature in the case; this has frequently been proved by *post-mortem* examination. In future, therefore, and with a view of settling this important point, pathologists in India must be doubly watchful against all source of fallacy in recording their observations. I am aware of the stringent regulations on the subject in the public services, regulations which cannot be carried out too conscientiously if our data are to be treated as trustworthy.

It cannot be said that the bacteriological study of dysentery has as yet given very decided results. Such investigations as have been made are somewhat contradictory. Possibly this may be more apparent than real, for it must be borne in mind that, as I have hinted, there is probably more than one form of dysentery. Although difficult and unpleasant, the bacteriological study of this disease is well worth undertaking, and ought to be carried out.

facts which may prove powerful aids in

settling many disputed points in the etiology of dysentery and liver abscess and their inter-relationship have been but recently discovered. I refer to the discovery of the amœba coli in dysenteric discharges and in the pus of liver abscess, and to the discovery of the fact that in many, not in all, cases of liver abscess the ordinary pyogenic micro-organisms are entirely absent.

The amœba coli we frequently find in England, both in dysentery and in liver abscess patients from the East. There can be no question, therefore, about the fact of its existence; the only question that can be is as to its significance. When one has seen this parasite crawling about in liver pus and in dysenteric discharge, it is difficult to conceive that so large and active an organism could penetrate the walls of the intestine, and push its way among the liver cells without inflicting much damage. Councilman and Lafleur, and that most acute and experienced Anglo-American observer, Osler, distinctly regard this organism as the specific cause of a particular type of dysentery, and also as a cause of liver abscess. They have not arrived at this conclusion without long and patient observation, observation carefully recorded in the *Johns Hopkins Hospital Reports*, Baltimore, 1891, where an excellent summary of the entire question of amœba coli up to that date can be found.

Although not absolutely an Indian discovery, the amœba coli, or an amœba of the colon, was studied in India long ago by Lewis and Cunningham, and by them disallowed pathogenic properties. Others also have declared against the pathogenic qualities of amœba coli for the reason that the same or a similar organism is frequently found in healthy conditions of the alimentary canal, and unassociated with disease of any kind whatever. This may be quite true; but, at the same time, it does not follow that under particular conditions—say, for example, catarrhal inflammation of the bowels or ulceration of the bowel from other causes, the amœba may not successfully attack weakened tissues, and thus become a serious complication and source of danger. Many micro-organisms are pathogenic only in the presence of tissues with lowered vitality. Then again there may be, probably are, several species of intestinal amœba, some innocuous, others pathogenic. The whole question requires careful study, and in view of recent investigations on the Continent of Europe, of those by Kartulis in Egypt, and of those just alluded to, and of others in America, it might be well for pathologists in this country to return to the study of this parasite, and to revise the dictum of the distinguished Indian observers I have mentioned.

At all events the amœba coli is a parasite with which all physicians in India ought to make themselves practically familiar. It is easily recognised in dysenteric discharge and in liver pus. A fragment of the fresh mucus in the one case or of the fresh pus in the other—by fresh I mean discharge which has not been out of the body for more than an hour or so—is spread on a slip and compressed under a cover glass into a thin transparent film. It is then to be examined with a magnifying power of from 100 to 300 diameters. Sometimes several amœbæ are visible in every field, sometimes a good deal of searching is necessary before a solitary specimen can be discovered. If the weather be warm it may not be necessary to heat the slide; but if the weather is cold some form of warm stage may be required to bring out the characteristic amœboid movements of the parasite. A piece of copper or of tin, suitably cut, and a spirit lamp suffice for this. The amœba can be readily recognised by its movements. It is a transparent, colourless, slightly granular organism, in size from three to six times the diameter of a blood corpuscle. Sometimes it is very active in pushing out its pseudopodia; sometimes, particularly when the slide cools down, it becomes spherical, passive, and not to be vouched for so easily. These few hints as to the method of search and as to the characters of the amœba may be of service to some of my hearers.

The other discovery of recent date to which I alluded—the frequent absence of pyogenic organisms from the contents of liver abscesses—is also a circumstance well deserving of further investigation. This fact likewise has been thoroughly established. Taken along with the frequent presence in liver abscess contents and liver abscess walls of the amœba that there is a radical difference between liver abscess and other and ordinary forms of purulent accumulation. Whether the ordinary pyogenic micro-organisms are present in the earlier stages of liver abscess and subsequently die out it is impossible at present to say; and the same remark applies to the absence of amœba coli in other cases; but certain it is that in a large proportion of liver abscesses, when their contents come to be examined bacteriologically, competent bacteriologists have failed to detect the presence of the usual pyogenic bacteria.

These are but a few of the questions connected with dysentery calling for settlement. Time will not permit me to allude to such points as the connection of this disease with water supply, with malarial conditions, and many other points of interest and importance. An excellent *exposé* of many of the various questions connected with the subject will be found in Davidson's *Hygiene and Diseases of Warm Climates*, and in the other work of modern date I have already alluded to—Kelsch and Kiener's *Maladies des Pays Chauds*.

BERI-BERI.

During the first half of the century beri-beri received considerable attention from our countrymen in India; of late years it has been almost completely neglected here. All the more important recent advances in the subject we owe to foreigners or to our own countrymen working in many different places, but not in India. These observers have succeeded in showing that beri-beri is virtually a specific disease, produced by a specific poison originating in definite and fairly well understood circumstances, and manifesting its pathological effects in the form of a well defined variety of multiple peripheral neuritis.

Although we have got thus far in the study of beri-beri, there is still a large field for useful and original work on the subject for you in India; the germ of the disease has still to be discovered. It is true that Pekelharing and Winkler so write that they would lead us to understand that a germ has been found in the blood in beri-beri both by direct observation and by culture, and that this germ when introduced in a particular way into rabbits and certain other lower animals gives rise to nerve degeneration and clinical conditions resembling those of beri-beri. But they overlook the circumstances that nerve degeneration is a normal and frequent, if not invariable, phenomenon in the peripheral nerves of all rabbits whether healthy or diseased. Scheube, in his recently published work, *Die Beri-beri Krankheit*, and which is one of the best, as it is one of the most modern, monographs on this disease, points out this source of fallacy very distinctly. Besides Pekelharing and Winkler, other observers have found micro-organisms in connection with beri-beri and, strange to say, their micro-organisms also, though most of them differ in their morphological characters from each other and from Pekelharing and Wiukler's white micrococcus, possess the faculty of producing peripheral neuritis and symptoms like those of beri-beri when injected into the lower animals. So say their discoverers; but in no case, with possibly one exception, have these observations been confirmed by rival workers. It is therefore evident that here again is a fallow field for the Indian worker.

Very little has been said in recent years about the distribution of beri-beri in India. Leslie and some others have drawn attention to its occurrence in Burmah; but as regards its distribution in India proper, we really have no available recent information. We know for a fact that it exists in Bombay; at all events we see in London cases of beri-beri not a few among the Lascar crews of ships coming from Bombay. We presume, therefore, that the disease must be endemic in Bombay, and if in Bombay, probably elsewhere in India. But since the times of Malcolmson, Carter, and Morehead, we have had no systematic account of beri-beri in India by one practically familiar with the disease. Is this because the disease has disappeared from the land? Surely not. The physical conditions have not materially changed since the olden times, and in most respects we find in India those conditions of climate and insanitation which in Japan, in China, in Brazil, in Africa, in the West Indies, and in the Malay Archipelago, give rise to this very dangerous disease. I believe that if proper and systematic inquiry were made, we should find beri-beri to be as common in certain districts of India as in the countries I have mentioned. This point is certainly one which ought to be settled by the profession here.

So little has this subject been studied of late in India, that when in 1870 a peculiar disease, characterised by fever and general œdema, broke out in Calcutta, the profession was divided as to whether the disease in question was beri-beri or a new disease altogether. I understand that even to this day no decision has been arrived at on the subject. Mecleod's recently published account of this epidemic[1] is a model in its way, and enables one to conclude that the disease he describes is not beri-beri. Similar investigations, however, in different parts of India would probably reveal the fact that genuine beri-beri has by no means disappeared.

I would suggest to you to pay more attention than hitherto to cases of paresis, with or without œdema, and complaint of rheumatic-like pains among the natives. I believe that such cases are common enough in certain districts, and that they are examples of some form of endemo-epidemic peripheral neuritis—most probably beri-beri.

A great deal of confusion has been caused by the careless way in which this term "beri-beri" has been applied in the East. I take it that the word "beri-beri" ought to be confined to the disease I refer to, to the endemic multiple neuritis Malcolmson so carefully described, and which was first introduced to European medical literature by Bontius more than a century before. We find the same word applied to several other conditions, however; in Assam, for example, as Giles has pointed out, to what are manifestly cases of ankylostomiasis, and, possibly, to a variety of malarial conditions. In Ceylon the same misapplication of the term is in vogue. This ought to be corrected.

There are some very suggestive analogies between beri-beri and malaria, and between both of these diseases and rheumatism, analogies which are perhaps worth following up. For example, all of these diseases may and often do rapidly bring about a state of anæmia. None of them runs a definite course, limited in the matter of time in a definite way like the exanthematous fevers. In none of them is one attack preventive as regards a subsequent attack; on the contrary, one attack seems to predispose to another. In all of them damp surroundings seem to be a necessary condition, or, at all events, a condition highly conducive to the generation or multiplication of the causal germ. None of them appears to be directly communicable. Now, as these diseases seem thus closely to resemble each other in so many points, it is just possible they also resemble each other as regards their causes. This having been shown in the case of malaria to be a protozoon which inhabits the blood corpuscles, the idea is forced on us that it is not improbable that a similar cause is at the root of beri-beri, and perhaps of rheumatism. Indeed, only recently Glögner has stated that he has found such an amœboid parasite in the blood in beri-beri. Possibly this too is a hint worth following up.

There has been a good deal written about beri-beri lately. Probably the best work is that by Scheube, already mentioned, but which, so far as I know, has not yet been translated. Pekelharing and Winkler's work has been translated both into French and into English, and a useful *précis* of their principal results has been published by Leslie. Lately Bentley has published in book form an excellent clinical account of the disease. A *précis* of our present knowledge on the subject will be found in Davidson's work.

ANKYLOSTOMIASIS.

The discovery in Assam that a vast amount of sickness among the coolies on tea plantations and among the natives of certain villages was caused by ankylostomum duodenale, and a similar discovery in Ceylon, have led to some very interesting investigations into the distribution of this parasite in India and the East generally, and which are likely to bear practical fruit. Doubtless much of the anæmia so prevalent among natives is attributable to ankylostomum. The general appreciation by the profession of this fact, a knowledge of the methods of diagnosing the presence of the parasite in the alimentary canal, and of the use of thymol as a remedy, will save many a life and much invaliding and suffering.

Giles's observation that the ankylostomum passes through a reproducing rhabditiform phase outside the human body, if confirmed, is a new fact in helminthology. It shows once more how energetic Nature is in her endeavours, in the case of this and similar lowly and unprotected organisms, by the multiplication of individuals to prevent the extermination and secure the continuation of a species. This very circumstance, this exuberant fertility, also shows that the position of the parasite is an exceedingly precarious one, that its enemies and risks are numerous, that Nature has a hard struggle to prevent extermination. The numbers of the offspring of any particular species is a very fair gauge of the chances of the individual arriving at maturity: these chances are in inverse proportion to the fertility. When we see Nature struggling to multiply and ever multiply the immature progeny of a particular parasite, depend upon it the chance for any given individual among the swarms of young to arrive at maturity is proportionately small; and we are therefore justified in inferring that a trifling increase of the risks it has to run, a slight interference on our part properly directed in the matter of hygiene, would probably suffice, if not to exterminate the species it belongs to altogether, at all events to keep it well within bounds.

Dobson's investigations have shown not only that the ankylostomum is widely distributed throughout India, but that several other species of entozoa, which were formerly looked upon merely as rarities and helminthological curiosities, are by no means uncommon. In the light of these investigations, these rarer helminths are manifestly of very much greater importance than was at one time supposed. It is a pity on this account that Dobson did not supplement his macroscopical with microscopical examinations equally carefully conducted.

I sincerely trust that these helminthological studies will be followed up, and that the gentlemen I have mentioned and others will add yet other discoveries to those with which

This matter of the prevalence of animal parasites in the intestinal canal as well as in the blood and tissues of the natives of India and other tropical countries is eminently suggestive of the absence as well as of the importance of sound hygienic conditions, particularly as regards water supply, and directed to the exclusion from this not only of animal parasites, but of parasites in general. This fact suggests the reflection that if under the present hygienic conditions animal parasites are so extensively prevalent in India, these conditions are still more favourable for the spread of such diseases as cholera, dysentery, and other grave waterborne zymotic affections; for if the relatively large and substantial ova or embryos of the animal parasites can find access to the human body through the medium of water so freely, how much more readily must the infinitely minute germs of the diseases I mention, do so. It may be taken as a fact that the degree of prevalence of animal parasites in the general population is a good though rough test of the quality of the hygienic conditions under which this population lives, particularly of its water supply. This test applied to India affords an object lesson which appeals very directly to the understanding, proving in an unmistakable way the urgent necessity for a more systematic and general study of the question of the water supply of the people. Reform in this matter is not in the hands of the profession, it is true; it is a Government matter. But it is the duty of the profession to "post" Government on the subject, and to educate the public mind up to the point of demanding and being willing to accept reform.

I have often thought that if the rising generation were, as a matter of school routine, educated in the principles of hygiene, the practice of the rules of hygiene would come to it in after life easily and naturally. I do not see that the objects of education would not be quite as efficiently attained by training the mind of youth in the study of such practical subjects as by cramming it with a knowledge of the classics and ancient mythologies.

CHRONIC INTESTINAL FLUX.

Forms of chronic intestinal flux are exceedingly common in India, as in all hot countries, particularly in Europeans. No very energetic effort has been made in recent years by our English workers to study and elucidate the nature of many of these affections. That they are of different kinds and acknowledge different causes is evident. Chronic dysentery is, of course, accountable for a considerable proportion of these cases, but besides chronic dysentery as a cause of chronic intestinal flux we have many other conditions. These ought to be more distinctly defined, and also provided with specific names. For example, we have that form of diarrhœa which is associated with a visit to the cooler health resorts on the hills, and which has in consequence acquired the name "hill diarrhœa." We have also that form of chronic diarrhœa which is associated with relapsing catarrhal inflammation of the entire tract or part of the tract of the intestinal mucosa, and which is characterised by sore mouth, pale, fermenting, loose, massive stools, and which, if not treated judiciously and at a comparatively early stage, terminates in chronic physiological starvation from atrophy of the mucosa and ultimately in death. This affection is not confined to India, but is found all over the tropical world, notably in Java, Cochin China, Manila, China, in the West Indies, and, I believe, in Africa. In the Malay countries and in China it is known by the name of "sprue;" in England it is now sometimes called "psilosis." Contrary to what is generally supposed this is not an uncommon disease in the West Indies; indeed, one of the best descriptions of the clinical features of the complaint we owe to Hillary, who wrote of the disease as he saw it in Barbadoes last century. Those who are interested in this subject will find a very elaborate account both of the literature as well as of the clinical and pathological aspects of the disease in Bertrand and Fontan's *Entero-colité des Pays Chauds.* These writers are perhaps somewhat one-sided and cocksure in their views, but they give an excellent summary of all that is known up to 1887, and their workers on tropical disease to the very valuable and extensive French literature on this and kindred subjects.

Besides the two more or less defined and named forms of chronic flux which I have mentioned, and which have this in common that the stools are pale in colour and fermenting, we have other forms of diarrhœa. There is a form of chronic colitis which, apparently, is not associated with what we might term dysenteric ulceration. Then we have that peculiar form of diarrhœa, so common in the tropics, which is called "morning diarrhœa," and which, judging from the peculiar acrid bilious nature of the stools, seems to be caused by sudden and excessive hepatic activity. This is almost a normal condition with many people in the tropics. We have also types of diarrhœa dependent on degrees of portal congestion, and which are relieved by saline purgatives. Then among the natives we have the cruder forms of diarrhœa depending on a variety of gross lesions and conditions, and on various combinations of these lesions and conditions. Chief among these are the famine fluxes so elaborately and successfully studied by Cunningham.

All of these intestinal affections require further study. As I have said, their types should be distinctly separated and defined, and their pathology brought into line with the medical science of the day. One often thinks that the diseases of the inner skin—of the intestinal mucosa—must be just as numerous, just as complicated as the diseases of the outer skin. And if this be the case the dermatology, if I may use the expression, of the inner skin—of the intestinal mucosa—must be every bit as difficult and complicated as that of the external skin. If this be so, we have truly a very long road to travel yet before we even begin to have anything like a scientific insight into this most important department of tropical medicine. Indeed, there is hardly one of these mucous membrane diseases whose characters, symptoms, and pathology have been accurately laid down. As for treatment, it is entirely a matter of empiricism, tempered by the prevailing fashion in medicine; and this it will continue to be until the progress of intestinal pathology has

TYPHOID FEVER.

One of the best pieces of work which of late years is to be credited to the profession in India is the separation of typhoid fever from the malarial group. I have no time to go into the many points of interest in this connection; there is one, however, on which I should like to say a word.

Such is the frequency of typhoid in young European immigrants in this country—and that in spite of elaborate sanitary precautions, which, if taken in Europe under similar circumstances, would practically ensure immunity—that the idea forces itself on us that the typhoid germ in India may have a somewhat different history from what it has in England. Epidemics of typhoid in England generally succeed, and can almost invariably be traced to the arrival of a case of the disease in the district subsequently affected, and they can be stopped by sanitary measures based on the assumption that every case is derived from a previous one. Typhoid there does not often, if ever, arise *de novo*. It is as if the typhoid germ, although it may be able to live for a time as a saprophyte, must ultimately, if it would retain its virulence, be resuscitated, so to speak, by passing occasionally through the human body. But in certain warm climates it would appear to be otherwise; it would seem that in some of those countries and in some instances the germ which produces typhoid has always been a saprophyte, is a native of the soil, and needs no periodical resuscitation in the human body to confer on it pathogenic properties or to keep it in existence as a species; in fact, that in its normal state it is an inhabitant of the soil—a genuine saprophyte—whilst at the same time it is capable of living and causing disease if by chance introduced into the human body. This is very much the same as in the case of the malaria germ or of the germ of beri-beri. Here is what Davidson says in his *Geographical Pathology* on this point; evidently the same idea has occurred to this writer, whom his elaborate epidemiological studies and judicial turn of mind

"In such cases as are truly typical, the disease occurs under circumstances that render it in the highest degree improbable that it has been derived from a previous case. Hunt, for example, stating his experience of the etiology of such typical cases in North Queensland, says, 'they occurred in remote stations, far removed from the routes of traffic, where no typhoid was ever known.' These are almost the same terms in which Crawford describes the occurrence of the disease in Afghanistan, and Hoff in the United States."

If this view of typhoid in the tropics is well founded—and it appears to be worth considering—there is an explanation of the inefficiency of the sanitary measures at present in vogue, and also of the great frequency of the disease in our young soldiers in India.

CHOLERA.

It may seem strange that I should have left to the last the consideration of that most important of the indigenous pathogenic products of India—namely, cholera. But you will observe that it was necessary for my purpose that I should fix firmly in your minds the fact that man is surrounded by a host of minute enemies, which not only can live in his tissues and so produce in him disease, but can, more especially in hot climates, maintain an independent existence outside, in soil or water, as may be the case.

This being once demonstrated, as in the case of the coarser intestinal parasites such as the ankylostomata, the blood parasites such as the filaria, the malarial parasites, the guinea-worm, and other disease-producing organisms, and it being once recognised, on the one hand, that the maladies produced by them occur with enormous frequency in India, and, on the other hand, that they in all cases gain access to the body by being swallowed along with what is drunk or eaten, our minds are prepared to admit that, whatever may be the case in other countries, in India at least the habit of drinking water sufficiently impure to carry organisms into the intestines is common enough to cause coarsely parasitic maladies to rank among the most frequent diseases

Who, then, shall separate cholera from these other waterborne diseases, and deny that it also is carried into the mouth by water? In Europe we have the proof that by being so introduced it can produce great outbreaks of the disease; in India we have in the vast extent of its parasitic maladies proof that the habits of the people are such that, if the cholera germ were present in the water, it certainly would not lack opportunities of being swallowed. And when, along with such conditions and opportunities, we find cholera almost constantly present, we see no possible excuse for hesitation for accepting the dogma which I have so long taught, that in India, as in Europe, cholera is a filth disease, carried by dirty people to dirty places; that its common mode of access to the interiors of these people is by the water which they drink, and that it may properly be described as a waterborne disease.

I have been much misunderstood in regard to this phrase "waterborne cholera." It has been taken as meaning that rivers and streams are the means by which cholera is distributed, and the fact has even been brought forward against the "water theory," "that cholera in India, certainly in the Bengal Presidency, always advances up stream."

What, then, do I mean when I say that cholera is a waterborne disease? I mean that it is caused by a poison which is swallowed, and which in ninety-nine cases out of a hundred is carried to the mouth in water. Within the body this poison grows, multiplies, and in its growth causes the disease, in the course of which it is discharged; then it is ready to take up the other phase of its life, to grow in damp earth, to breed in dirty water, to be washed by rain into watercourses, to soak through porous soil into wells; in some very rare, unproved cases, perhaps, where cholera is very rife, and filthy habits are overabundant, to be blown by gusts of wind or carried by the hand into food, and thus by one means or another, but in an infinitely larger proportion of cases by means of water, to get round to another person's mouth, to be swallowed and again set up the whole cycle of events. It is not a mere matter of rivers and watershed, but of cooking utensils, drinking cups, water bottles, and cans because it is carried by water to the mouth; but that is only the last stage of a journey, circuitous and long, though often not difficult to trace, by which it has travelled from its past to its present host. Inside the body the poison passes, often killing the patient in its passage; outside its course is halting, erratic, various in manner and intensity, depending largely on the physical surroundings in which it finds itself (the soil, the water, the temperature), by which oftentimes it is destroyed, or amid which it dies out.

If it lives through its adventures and lands again in the body of a man susceptible to its influence, then again it has its chance, and sets up afresh the old disease. If we fully grasp this conception of the malady, facts fall into their places. The seasonal curve becomes a curve depending on the proper heat and moisture requisite for the development of the most active outside life of the contagion, on thirst causing large drinks, on scanty and therefore foul water, on rains washing accumulated filth into the tanks and watercourses, on a mass of physical causes, and not on the spread of an "epidemic influence." The varied susceptibility of individuals points to varied powers of digesting and thus destroying the contagion, and the greater liability of some nations to be attacked depends on their greater willingness to drink contaminated water. Truly cholera is a filth disease. In the region of the lower Ganges, "the home of cholera," the air, the water, and the soil are never cold, and the ground is often damp, and when it is dry the tanks are foul, so that always there is a fit breeding place for the contagion, and the habits of the people in every way facilitate its entry into their systems. There is nothing strange, then, in cholera becoming endemic in this area: there is a climatic condition, such that the germ can keep alive for considerable periods outside the body, and there is an endemic habit of drinking it freely, but if this habit is broken people can and do live in the very midst of this area free from cholera, and whole districts and communities have thus been endowed with an immunity depending merely on the breaking of one link in the chain of events by which cholera is produced, namely the habit of drinking contaminated water.

Among the manifold influences which conspire together to cause an epidemic prevalence of cholera is this important fact that to pass from man to man it must be swallowed, and because this is an essential link in the chain, I advise the provision of pure water as the one practicable measure by which this transmission can be prevented. India's real want is pure water. The difficulty of meeting it is largely one of expense, but that this is no small obstacle may be judged of by the facts put forward in a paper read recently before the Indian Section of the Society of Arts, by Sir Auckland Colvin, on Municipal and Village Water Supply in the North-West Provinces and Oudh. In that portion of India alone there are 41,600,000 persons scattered over 106,000 villages and 241,194 inhabited sites. The hamlets lie for the most part on the flat land, or a little raised above it, scorched alternately by sun and drenched by continuous rain, in entire disregard of all sanitary care; their occupants drinking from the pond in which they bathe and in which their cattle wallow, surrounded by the refuse of their daily lives, far from the eye of the English officer, and, if coerced at all into cleanliness, to be coerced only by the ever-itching palm of the underling—little less opposed than themselves to the *régime* of sanitary regulations. It is these rural tracts, this innumerable firmament of hut and hamlet (the village houses numbering over 7,000,000), scattered over a total area of 112,612 square miles, where no eye can hope at all times to see, no hand to penetrate—whose millions call for sanitary aid, but whose poverty make its impracticable, that are the despair of the sanitary reformer. The difficulty in the cities is not so great; poverty is not so abject, and there is among the people more willingness to accept new ideas; and it is satisfactory to note that since 1888—the year of publication of Lord Dufferin's celebrated sanitary resolution—the cities of Agra, Allahabad, Benares, Cawnpore, and Lucknow have successively undertaken, completed, and opened extensive schemes of waterworks, the distribution of filtered water having for the first time been commenced in each of these towns since December, 1890. The real trouble in the large towns is the disposal of the sewage the ignorance and indifference, prejudice, and passive resistance of the people, and it is probable that for a long time to come they will have to depend largely on wells and tanks and carried water. Sanitary efforts, then, will have to be mainly occupied in endeavouring to keep clean the supply which already exists—in itself no mean task. The mere protection of the country wells, surrounding them with cemented platforms, providing them with clean apparatus for drawing, so that they shall not be befouled by those who use them, and guarding them against misuse, would be a great work for any administration, and it is slowly going on. Improvement is no doubt gradually taking place, but the immensity of the population and the poverty in which they dwell are great hindrances to progress. People, however, who talk of doing good to India should remember that India's great want is water fit to drink.

Of the many systems which have from time to time been suggested and in operation for the purification of the water supplies of great towns, I know of none which is nearly so efficient and so well capable of removing pathogenic germs and rendering the water healthy for drinking as that of the Anderson Revolving Purifier. This is in use in India in Agra, where I understand it has effected an enormous improvement in the water, and given excellent bacteriological results. It has also proved its remarkable capacity in this respect at Antwerp, Dordrecht, Libourne, etc., and recently in Paris, where it has been selected in competition with all others for the purification of the water supply of the suburbs of Paris by the Compagnie Generale des Eaux.

I wish, however, particularly to guard myself against the charge of looking at water carriage as covering the whole pathology of the disease or explaining the etiology of i occasional epidemic prevalence. The drinking of the cholera poison is essential to the production of the disease, and the provision of pure water will prevent the necessity of drinking this poison and so prevent the possibility of the disease developing, and, as a sanitarian, that is for me sufficient. It must not be imagined, however, that because I insist so strongly on this life-saving side of the question that I am

I am as aware as anyone can be that we have much yet to learn regarding the causes of the epidemic spread of cholera, and it is to a continued investigation of these causes that I would urge my medical *confrères* in India, but this investigation must be always undertaken on the basis of established truth, and especially that great truth that cholera goes in at the mouth.

Dr. Solomon Smith has lately drawn attention to the fact that what causes disease in an individual is by no means sufficient to cause its epidemic spread, and that while as regards the individual the causes of an attack of cholera lie between his own susceptibility and the dose of the poison swallowed, as regards the epidemic the causes may have much more to do with the conditions amid which the microbe passes the outside phase of its existence. Dr. Smith states the matter in a way to which we may all give full concurrence: "However true it was that cholera was taken in at the mouth' mostly in the water that was drunk, other factors were necessary for the production or, at any rate, for the continuance of an epidemic. These factors might be grouped as: (1) Those which increased the susceptibility of individuals, about which we knew but little; (2) those which favoured the outside growth and development of the infection—heat, moisture, organic impurity of soil and water, aëration of soil, etc.; (3) those favouring the fouling of the water, floods, or droughts according to circumstances, varying level of subsoil water, construction of wells, tanks, and water supplies, their relation to cesspools and surface pollutions, and social habits of the people, by which such pollution was encouraged and carelessness as to drinking foul water was induced; (4) those by which the infection was transmitted from place to place, especially movements of large masses of people as in pilgrimages and wars, and the rapid distribution of cholera-infected people over large areas in some part or other of which a suitable nidus for fresh growth of the infection would be likely to be found. Cholera was no doubt continually being exported from its home in India, but it only occasionally became epidemic in those places where it was an exotic, and when this happened we must look for an explanation not merely to water carriage, which was the mere mechanism of its spread, but to a coincidence of those varied and complex causes which assisted in the intensifications of the disease. To some extent the production of an epidemic was analogous to the opening of a 'word' lock. As all the letters must be placed in position before the lock could be opened, so many factors must combine before an epidemic of cholera could be caused. The converse of this, however, was also true, and on this was founded our protection from cholera, for however little we might know with precision about some of the multiplex causes of a cholera epidemic, we did know that one essential cause, one letter to the lock, was the swallowing of the poison; and thus, by a provision of pure water, we were able to break up the combination by which alone an epidemic could be produced."

It was, perhaps, only natural that the discovery of the water carriage of the infection should be made in countries where cholera only arose at long intervals of time, and where every step in its progress could be traced; at any rate, that and the isolation of a microbe as a cause are Europe's contribution to the investigation. It is for India to study on the spot the influences which render the individual susceptible, and those which make for or against the growth of the contagium outside the body; influences, in other words, which turn this always waterborne disease from a local scourge into a widespread pestilence. In this regard I would venture to suggest two special lines of inquiry on which accurate information is just now greatly wanted, and concerning which India, with its great opportunities, may fairly be expected to give some answer: (1) What is the relation between the preceding and concurrent diarrhœa and the actual cholera; (2) is any other micro-organism besides Koch's bacillus engaged in the production of the disease? It is impossible to hide from ourselves that, without impugning the water carriage of the infection, bacteriological examinations both in cases of sporadic disease in England and of various water supplies abroad have thrown a certain doubt on the the power of Koch's bacillus acting by itself to set up the disease, and we greatly want to know whether any other coincito enable the cholera microbe to play its part. For investigations of this kind admirable opportunities are afforded in that large portion of India which, although outside the "endemic area," is still frequently attacked by a truly epidemic prevalence of cholera, and it is to be hoped that before long our knowledge on these matters will be largely increased.

In the meantime I would urge that certain definite precautions should be taken to limit the dissemination of the disease and to prevent its spread to other countries.

Let me then formulate the steps which ought to be taken to save the Mohammedans from the danger caused by their pilgrimages, to save the world from the danger caused by Mecca:

1. The Indian sanitary services should be reorganised on the following basis:

(a) An Imperial sanitary department attached to the Government of India.

(b) A provincial sanitary department attached to each of the provincial governments, such as Bengal, North West Provinces, Punjab, Madras, Bombay, Central Provinces, etc.

(c) A local sanitary department attached to each municipality, district board, etc.

(a) The Imperial sanitary department should be administrative and scientific, and quite distinct from the sanitary department of the army. It should consist of (1) the Sanitary Commissioner with the Government of India; (2) a deputy sanitary commissioner; (3) a medical statist; (4) a veterinary commissioner; (5) a sanitary engineer; (6) a Minister of Health, having a seat in the Viceroy's Council, as president. Scientific agents: Laboratory with trained experts. Duties: The advising of the Viceroy and Council on important health matters, either initiated by the Imperial sanitary department, or referred to it by the local governments; the collection and publication of information as to epidemic disease existing in India and in other countries; the right of asking from provincial governments what they propose to do, or have done, in checking or inquiring into diseases affecting man, animals, or agriculture in their provinces; the arrang-

uniform plan for ready reference; the acquiring of all information regarding the movements of pilgrims, coolies, and emigrants, and the advising the provincial governments, and requiring the latter to take proper precautions; the consideration of new sanitary laws, etc.

(*b*) The provincial sanitary department should consist of the following sanitary officers appointed by the local government: (1) Sanitary commissioner; (2) assistant sanitary commissioner; (3) sanitary engineer; (4) a president, who should be a high officer in the Civil Service. Travelling agents: Deputy sanitary commissioners or inspectors, vegerinary surgeons, deputy sanitary engineers, as may be required. Scientific agents: Trained professors and assistants in government laboratory for bacteriological, chemical, agricultural work, etc., and general sanitary investigations requiring to be done in laboratory. Duties: To control local authorities; to institute special investigations at any particular spot on any particular subject; to make by-laws and amend sanitary laws; to investigate diseases of men and animals, and study agricultural pests, etc.; to analyse water, etc.

(*c*) Local sanitary departments to consist of municipal commissioners or district magistrates, with civil surgeon when obtainable. Executive agents: A health officer, attached to one or more towns; an engineer in a similar position, and a sanitary staff for each place as required. Duties: Conservancy, water supply, building regulations, drainage; registration of births and deaths, vaccination, stamping out of infectious disease, and informing provincial authority by weekly reports as to prevalence of cholera, small-pox, or other dangerous disease.

2. A complete sanitary regulation of all Indian fairs should be undertaken, the precautions so successfully taken at Hardwár in 1891, being taken as a type.

3. A rigid system of medical inspection of all pilgrims should be instituted at the ports from which they start, the sick being detained, and the healthy alone allowed to proceed. This, it may be added, would be all the more effectual in regard to Indian ports from the fact that a second weeding out of the infected can take place at Kamaran

4. The medical inspection at Kamaran should be so conducted as to secure its complete efficiency. Among the inspectors should be qualified medical women, without whose assistance the medical inspection of Mohammedan women must be either a farce or a great cause of offence; and, if possible, these medical women should be selected from among Mohammedan women doctors, of whom numbers are now educated in India.

5. At Jiddah the sick would again be weeded out.

6. The sanitation of Mecca should be thoroughly reorganised under the auspices of the Turkish authorities. The water supply from its source to its distribution should be carefully inspected and protected from contamination. The poison well Zemzem should be cleaned and provided with a larger supply and a continual change of water, and the most complete precautions taken that the water used to bathe the pilgrims should at once run away, and under no circumstances return to the well.

7. During the time of the pilgrimage a complete system of conservancy should be carried out on the Hardwár plan, the strictest precautions being enforced to ensure the immediate removal of all refuse, and the prompt isolation of all sick.

OFFICIAL DISCOURAGEMENT OF ORIGINAL RESEARCH.

I should like to say a few words on some other diseases of special interest to you in India, for instance, on the recently discovered proofs of the mycotic nature of mycetoma, in harmony with the views advocated so long ago by Vandyke Carter; I should have liked, also, to put in a word for the study of tropical skin diseases, so much neglected in India, particularly for the study of the epiphytic skin diseases, and in the light of Sabouraud's recent work on European ringworms. I should have liked, too, to have said something on that strange chancrous affection of the skin, Oriental sore, a sore which is protective against itself but which, unlike the syphilitic chancre, is followed so far as we know by no manifest constitutional disturbance. I should have liked to have spoken about the Leprosy Commission and their report and recommendations, and on many other points did I not fear that already my remarks have extended to too great a length.

Before concluding there is one point, however, on which I shall make a few observations. I know I tread on very delicate ground, that I run the risk of giving offence in high quarters. I trust, however, that should I prove to be injudicious, should I seem to be ungracious or even unfair in what I say my motives will not be misunderstood, and that I shall be credited as speaking, not from a spirit of captiousness, but from a patriotic and sincere love for the good and for the reputation of English medicine.

There was a time, and that not so very long ago, when all that was best and most valuable in the science and in the practice of tropical medicine was almost entirely of English creation. It is so no longer; indeed, it is very much the reverse. In one department you in India may still be said to lead the world; as tropical sanitarians and medical statisticians you are still infinitely ahead of all other tropical colonising Powers together, who, in these respects, are content enough to be your imitators. But I fear that here your pre-eminence stops; at all events where it should still be in the ascendant, your pre-eminence in tropical pathology, in the investigation of tropical disease, and in tropical medical literature is decidedly on the wane. It is unpleasant to feel this, still more unpleasant to have to say this to such an audience. It is a fact however—an ugly fact; but it is one of those ugly facts which ought to be faced, and if possible corrected. England with her huge tropical empire and the unbounded opportunities her services might afford ought to be *facile princeps* in tropical medicine. But is she so? Run over some of the names associated with most of the important recent discoveries in this department and judge. Cholera, Koch; leprosy, Hansen; malaria, Laveran; dysentery, Loesch; liver abscess, Kartulis; beri-beri, Scheube and Bälz: endemic hæmaturia, Bilharz; latest discovery of all, the bacillus of plague, Kitasato. This last is to us a specially humiliating fact. A pestilence breaks out in an important English colony. The local physicians display—as I trust Englishmen ever will—unlimited courage and devotion to duty; but the scientific part of the work has to be done for us—by outsiders. Japanese, French, and, I believe, German pathological science is represented, but, so far as we know, English pathology is not. One would think that at least India would have done her duty and her share in the investigation; India with plague ever on, if not within her borders, with no assurance that the fell disease may not any day break out in her midst, in her crowded cities not a whit better off in respect of their sanitary condition than Hong Kong.

Our countrymen, it is true, have done something of late years for tropical pathology, as my previous remarks amply testify, but what they have done is little in comparison to their numbers, to their opportunities, and to the work of foreigners. Why is this? Can it be remedied?

Why is this? There are many causes. I shall indicate what I think are the most important. As in England research is not adequately encouraged in India. So far as words go there may be the appearance of encouragement. But—so it is whispered—in reality research is frowned on in official circles here. There is a feeling that a man with a leaning to science, with a new scientific fact in his head, is regarded by officialdom as a nuisance, as a sort of pestilent fellow with a new bug. This may be an over-statement, but I am told this is the feeling in regard to the younger and more scientifically ambitious medical officers in India. Promotion, therefore, is felt to depend not so much on medical merit as on seniority, on knowing which way the wind blows, on avoiding giving trouble at headquarters, on respectable conservatism; so that in the race of life it is felt that the man who devotes himself to, and who distinguishes himself in, his purely medical duties is sure to be left behind by the man who devotes himself to the practice of patient waiting and a judicious diplomacy. The pathologist is out at elbows and is nobody: the diplomatic senior medical officer has all the plums. This, I am credibly informed, is the feeling in the services.

A second obstacle to the successful cultivation of medical research in India is the overloading of the medical officer with clerical work of the most menial character, and which might be very well and much more economically done by a less highly paid and less valuable officer. I have been told that the casebooks in many instances tend to be filled with the cases of patients requiring extra diet, and not with important medical cases. I understand that every insignificant case to which an extra egg, or such like, is prescribed, must be written out in full, while perhaps some case of medical interest may be neglected. This is a sad and surely avoidable waste of time and energy, and so throughout the whole of his duties; perpetual writing and red-tapism. Medical officers tell me they have to spend more time in their office than in their wards.

Another, and I believe an important reason for our backwardness in tropical medicine is the want of regular instruction on the subject in the schools. Netley, of course, supplies this to a limited extent, and to a limited section of medical men; but in addition to the army medical men, who alone enjoy the privileges of Netley, there are hundreds of English practitioners in tropical countries equally in need of appropriate nstruction, but who, very probably, have never seen a case of malarial fever, of dysentery, of liver abscess, of beri-beri, of filariasis, or perhaps of any tropical disease whatever, until they are called upon to diagnose, and to treat, and to investigate these complaints for themselves. Consequently, when these men begin to practise in the tropics, they have the entire subject to learn from the beginning. They have no one to teach them, often no book to guide them. Years must therefore elapse before they are familiar enough with the subject, and with what has already been done in it, to be in a position to add something to the common stock of knowledge about it. When that time has arrived the energy and enthusiasm of youth have passed; the career in the tropics is about over.

Then again, although what is called the combatant officer may come home at the public charge to furbish up his knowledge of killing machinery in an appropriate and well-furnished school, and to bring himself abreast of the times in guns and torpedoes, the medical officer has no such opportunity given him of rubbing up his fading knowledge of life-saving machinery and of acquiring fresh medical ideas. He has to come home at his own expense; and if he still retain a love for that profession which is so much re-pressed in the land of his adoption, and if he desire to bring himself abreast of the times he has humbly to solicit, hat and guineas in hand, at the door of some London hospital or laboratory for permission to learn.

All these things are emphatically not right. As a consequence tropical medicine languishes where it should flourish. When circumstances and public opinion do force Government to institute some scientific investigation, they do not find suitably trained men in the ranks of their own services; they have either to send home for them or they have to employ a foreigner. That, or they cynically leave the investigation to the enthusiasm of the foreigner, afterwards reaping the fruit where they have not strewn.

Is there a remedy for this disgraceful state of affairs, so galling to our pride, so unpatriotic?

1. I would make promotion in the medical services in greater measure than at present a reward for medical merit.

2. I would give, at the public expense, to deserving and suitable medical men an opportunity to return occasionally to Europe for a year or two to brush themselves up in medical matters, and to familiarise themselves with new methods.

3. I would have less clerical and more medical work in the services.

4. I would have the examining and graduating bodies in Britain to give at least one question in their examination papers in medicine on a tropical disease.

5. I would have the large hospitals in Liverpool and in London in which tropical diseases most abound affiliated with the local hospital medical schools in some way, and thus utilise their valuable clinical material, at present running to waste, for teaching purposes and for research.

CONCLUSION.

Gentlemen, I must end here. Although sensible of the merely sketchy character of the outlines to which the limits of time have confined my address, I trust that you may find in it some elements of useful suggestion, some helps towards redress of grievances, some links towards the formation of a chain which shall bind all the members of the profession in fraternal union and by union give them the greater strength. I have endeavoured, at the obvious risk of dulness, to avoid rhetoric or mere phrase making. Pemmican is never the most attractive kind of food, but it is sustaining and enduring. May my words spoken to-day prove to have the like qualities. I feel deeply grateful for the distinguished honour you have done me on this and on former occasions. It has been the ambition of my life to deserve and to requite such honour and such kindness by unremitting labour for the public good and for the highest interests and duties of our common profession. To have achieved some success in that aim to-day will amply repay my labours and anxieties in coming to you from so far and leaving behind me so much unfinished and suspended public work. It will be in your power to foster the growth of the seeds which I have endeavoured to sow. It will be the crown of a life spent wholly in the service of my profession and of my country as fellow subject with you of the Kaiser-i-Hind if I am allowed to see now and hereafter some evidence of having usefully helped the development of life-saving science, the enlargment of civic liberties, and the efficiency of the great public services in this vast Empire of ancient wonders and modern experimental marvels—this awestriking and beautiful India.

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THE BENGAL SANITARY DRAINAGE BILL.

I.

(Hindoo Patriot August 5, 1895.)

THE die has been cast—the Rubicon has been crossed—the Bengal Sanitary Drainage Bill has been passed—by the votes of the majority composed of the official members. But though the Bill has been passed the Council Chamber presented last Saturday a spectacle which, it is to be hoped for the sake of the good name of the Legislative Councils in India, will not be often witnessed in any part of the country where a Legislative Council is in existence. The analysis of the votes recorded respectively for and against the passing of the Bill affords a very profitable study. The votes in favour of the Bill were 10, those against it were 7. The majority consisted of all the official members and a solitary non-official member who, however, owes his nomination to Government, while the minority consisted of *all the elected members.* The officials were arrayed on one side, while the popular representatives on the other. Here is the division list :—

	For the Bill.	*Against the Bill.*
OFFICIAL MEMBERS.	Mr. Cotton	Mr. Smyth
	„ Buckland	Maharajah of Durbhanga
	„ Risley	Maharajah of Natore
	„ Bourdillon	Mr. Surendranath Bannerji
	Sir Griffith Evans	„ Annada Mohan Bose
	Nawab Ameer Hossein	Rai Ishan Chander Mitter
	Rai Durgagati Bannerji	Babu Guru Prosad Sen
	Mr. Romesh Chander Dutt	
	„ Lyall	
	and	
	Khan Bahadur Mahomed Yusuf	

Mr. Womack, the representative of the Trades Association was unfortunately unavoidably absent, but if he had been present, he would have assuredly voted against the Bill, as the other European elected member, Mr. Smyth, the representative of the Bengal Chamber of Commerce, did. Then we must remember that the Bhagalpur seat still remains vacant. Now whether Rai Surya Narain or his rival Mr. Hennessy had been elected, we may take it, that the Bhagalpore vote would have been cast against the Bill. It is clear, therefore, that if Mr. Womack and the Bhagalpur member had been present, then the figures would have been 10 against 9 and if Khan Bahadur Yusuff had not gone against the wishes of the whole country, as evidenced in the unanimous condemnation of the Bill by the elected members of the Council, but had voted with the popular representatives, then Government would have been landed in a minority. When a Bill is passed against the wishes of *all* the elected members, the fact affords conclusive evidence of the Bill being an unpopular measure and one that should not be made law. We can not congratulate Sir Charles Elliott on such a Pyrrhic victory which leaves the vanquishers poorer than the vanquished. If a measure cannot be passed except by the aid of the official majority, then we do not know what condemnation could be stronger than is furnished by this simple fact. The Bill has been passed, but the *unanimous* opposition of the elected members present an object-lesson which, we fear, nullifies the victory of Government.

It is clear—and last Saturday's debate affords ample additional testimony to it—that the promoters and supporters of the measure are themselves at hopeless variance with one another as to the object which the Bill is intended to promote. In his speech at Dacca in July, 1894, His Honour the Lieutenant-Governor thus explained the object of the Sanitary Drainage Bill:—"If Government were to derive benefit from useful criticism, those who gave it must understand and remember what the object of the Bill was. It was not intended to drain swamps and *bheels* and set land free for cultivation, as had been done in several cases in the Howrah and Hooghly districts, for this object could be effected through the Drainage Act of 1880. The Bill was not aimed at small clearances of marshy land or pools of water round villages or rural towns; this, like the clearing out or digging of new tanks and wells, could be reached through the Local Self-Government Acts and the operation of District Boards or possibly by Village Unions. The object of Government was to deal with the case of the silted-up rivers and water channels which have ceased to perform their old functions and no longer carry off the rain-water in a continuous stream." His Honour then went on to trace the changes whereby a "poisonous stagnant pond" here and there is all that is left to mark the course of what was once a beautiful and health-giving river. "This injury to the health of the country" continued His Honour, "to the drainage and the water-supply had been done by slow degrees and ignorantly; and now after many years, it was telling so seriously on the health of the people that, as the last census showed, the growth of population had been checked or entirely stopped in the districts" so affected. "These channels" explained His Honour "have to be re-excavated or new channels formed for the escape of the water. This could not be done without heavier expenditure than the Road Cess could bear, and it seemed just that it should be met by those who were to profit by it, not by the rate-payers generally This could not be effected without legislation and it was the object of the Drainage Bill to provide such legislation."

It will be seen from the lines quoted above that according to Sir Charles Elliott, the object of the Sanitary Drainage Bill is to "deal with the case of silted-up rivers and water channels which have ceased to perform their old functions." But in the Statement of Objects and Reasons, the improvement aimed at is stated to be that of "the sanitary condition of any local area" within a district. These two objects can scarcely be considered identical, but to add to our confusion, Mr. Bourdillon, in his circular inviting the opinion of public bodies on the Bill states that "most of the works contemplated as likely to be undertaken under the Bill are such as would affect limited areas only." From the "re-excavation" of "silted-up channels" and the making of new water-channels, to works affecting "limited areas" the transition is great and rapid. But we have still a few more commentaries on the Bill—to add to our confusion—as we have already said. In his speech last Saturday in support of the Bill, Mr. Lyall, the mover of the Bill, gave it as his opinion that the " chief usefulness " of the Bill will lie in its " judicious application " to smaller schemes." But Mr. Risley, who followed Mr. Lyall, differently interpreted the object of the Bill, which, he declared, had reference to "far-reaching and expensive drainage schemes." We may be pardoned, if after being confronted with this confounding array of conflicting interpretations, we are still left very much in the dark as to the object of the Bill.

We regret to see that the task of bolstering up the Bill should have devolved on Mr. Risley. His references to the venerable Duke of Argyll might have been more seriously meant and his criticism of the British Indian Association would have been more effective if he had taken the trouble to read all that the Association had said in their successive letters to Government on this Bill. His putting forward of Babu Surendra Nath Bannerjee was no doubt edifying, but it hardly affords evidence of the strength of the case he had to recommend. The Association contend that the Drainage Act, the Cess Act, the Embankment Act and the Local Self-Government Act already contain ample provisions for effecting the improvement contemplated in the Bill. Babu Surendra Nath Bannerjee's reply is that those Acts deal with the improvement of agriculture and the soil and have nothing to do with sanitary improvement, and Mr. Risley has appropriated Babu Surendra Nath's argument. Now, in our article of last Friday, we have already shown that the statement is not correct. Section the question of sanitation, as its wording conclusively shows. The Section runs as follows :—" It shall be the duty of every District Board, subject to any rules made by the Lieutenant-Governor, under this Act to provide, so far as may be possible, for the proper *sanitation* of its districts and to incur such expenses or undertake such liabilities as may be necessary in that behalf." Babu Surendra Nath's sweeping assertion is, therefore, strictly speaking, *not* correct But even if the Acts in question were silent on the subject of sanitation, still Babu Surendra Nath's position would be an untenable one. Those Acts provide for " improving the drainage " so that the measure indicated in those Acts is identical with that contemplated in the Sanitary Drainage Bill. But though the measures are identical, the objects,—says Babu Surendra Nath —and Mr. Risley follows him—are different, being agricultural improvement in the one case and sanitary improvement in the other. Now we confess the distinction herein sought to be drawn is too subtle to be comprehended by ordinary men. Surely, if any drainage work improves the soil, it will necessarily lead to sanitary improvement also. Where then lies the difference ? The one leads to the other in the natural course of things, as even Babu Surendranath will understand if he bestows a little more attention upon the subject.

Mr. Risley contends that the proposed Bill is an improvement upon the Embankment Act, inasmuch as the power of taking the initiative in the former has been vested in the District Board whereas in the latter this power is exercised by the Collector, whose little finger, says Mr. Risley, may be found' thicker than the loins of the District Board. We may observe at the outset that we had not much confidence in the District Boards, but we, who are opposed to the Bill and who oppose the imposition of fresh taxation, care little whether it is the Collector or the District Board that is to take the initiative. It matters little to the condemned Zamindar whether his executioner is to be the Collector or the District Board. When the Association referred to the Embankment Act they did not mean to say that the procedure of recovery should be in the present case the same as in the Enbankment Act, but they wanted to point out how unnecessary was the Act now passed. Mr. Risley's speech contains many other points of a controversial character to which we shall advert on future occasions. But before concluding this article we should like to ask how far the contention that the Road Cess and the Public Works Cess leave no balance to be devoted to drainage works or works of sanitary improvement would be borne out, if any one were to examine the statistics, not for one year only as he has done, but from the year in which the

Cesses were first imposed down to the past year. We are afraid the result of such an examination will not be in favour of Mr. Risley's illustration or argument.

II

(Hindoo Patriot, August 7, 1895.)

IN their last letter to the Government of Bengal, dated the 27th ultimo, protesting against the Bengal Sanitary Drainage Bill, the British Indian Association observed :—"But not the least objectionable feature of the Bill is its provision for the recovery of the cost from persons interested in the land. The Committee feel bound to point out the iniquity and injustice of the provision, considering that by the last Census barely half the population is connected with agriculture and that therefore a large proportion of those who would benefit by a drainage work would have nothing to pay while the whole burden of the cost would fall upon landholders and raiyats." Referring to the statement that barely half the population is connected with agriculture, the Hon'ble Mr. Risley said as follows at last Saturday's meeting of the Council :—" I do not wish to appear too critical. but I can't help doubting whether snipping bits out of newspapers is quite the best way of composing an official letter, though it may be the easiest. That is the history of the curious statement that according to the last Census, barely half the population were connected with agriculture. In point of fact the occupation tables of the Census show about 78 per cent of the rural population to be engaged in agriculture. But this really understates the case, for the simple reason that people whose caste occupation is non-agricultural but who also cultivate, get recorded as non-agriculturists."

His Honour the Lieutenant-Governor, relying on the authority of Mr. Risley, indulged in certain caustic observations at the expense of the British Indian Association. His Honour said:—" That a good deal of error existed on this subject was shown by the letter of the British Indian Association who had the rashness to assert that the agriculturists on whom the rate would fall formed barely half of the population. The gentleman who wrote that letter could not have consulted the Census returns and must have taken his figures from some other source. His Honour thought he had recently seen this statement in a newspaper article, and it may have been taken from that source, without any attempt to verify that statement. The Hon'ble Mr. Risley had exposed that, and gave the exact figures of the Census return, which put the agriculturists proper and the rural labourers, taken together, at 78 per cent, and he also pointed out other arguments which justified the assertion, generally accepted in all economic writings on Indian subjects, that the agricultural population could not be taken at less than 90 per cent. of the whole. The Hon'ble Ishan Chunder Mitter evidently failed to hear what the Hon'ble Mr. Risley said,and repeated the statement of the British Indian Association that the agricultural population was barely half of the whole population. This was an instance of how hard error dies, and how easily a mis-statement once set afloat is taken up and repeated without criticism or examination. It was important to impress upon the Association and public bodies who addressed the Council that if they want to do their best and honestly to assist the Government they must first learn to verify their facts. If these facts were properly understood they would not have so much of their time wasted." His Honour used rather strong language, but let that pass. We now proceed to examine whether the Association's estimate of about fifty per cent., or Mr. Risley's estimate of seventy-eight per cent., or the third estimate of ninety per cent. "generally accepted in all economic writings on Indian subjects," or His Honour's own estimate of ninety-five per cent. is borne out by the figures given in the last Census Report.

The subjoined table shows the population of each of the five Divisions in Bengal proper and the number of persons interested in land in each of those Divisions. We omit Bihar and Orissa, as according to Mr. Lyall " there is no likelihood of the Act being extended to" the Patna district and, we persume, that the same may be said of the other districts in Bihar. As regards Orissa, it is too healthy, with the exception of the District of Puri, to be affected by the Act. The figures are taken from the last Census Report on which Mr. Risley relies for his own estimate.

Divisions:	Total population.	Number of persons interested in land.
Burdwan ...	7,688,818.	3,963,609.
Presidency ...	8,535,126.	4,195,360.
Rajshahi ...	8,019,187.	5,783,468.
Chittagong ...	4,190,801.	2,802,818.
Dacca ...	9,844,127.	6,765.856.
	38,278,059.	23,511,111.

This gives a percentage of 61.4 as representing the number of persons interested in land compared with the total population of Bengal proper. But even this percentage is susceptible of reduction. The method of classification as regards the occupation of the population, followed in the Census Report of 1881 as well as in that of 1891, was admittedly defective and the figures are confessedly very far from reliable. In the Census Report of 1881 Mr. Bourdillon, who was entrusted with the Census Operations in Bengal, observes :—"It is not too much to say that to the single subject of occupations must be debited at least one third of all the labour, time and money expended upon the preparation of the census tables. No regret would be felt for all the labour and money lavished on these tables, could it be believed that they furnished an adequate return ; but unhappily this is not the case. After great efforts, the statistics have been extracted from the schedules and marshalled in order ; but it is equally impossible to deny the fact that the information given in the schedules was in many cases vague or insufficient, or to assert that it has been set forth on the system best suitable to display the chief characteristics of employment in Bengal." This was in 1881. Was there any improvement in this respect in 1891? Hardly any. In his Census Report of 1891 Mr. C. J. O'Donnell, Superintendent of Census operations in Bengal, writes :—" The chapter on occupations is to a great extent the acknowledgment of partial failure." Again :—"The record of the occupations of a population so vast as that of the lower Provinces of Bengal, must always be a task of extreme difficulty, and the experience of three censuses has proved that it is more than doubtful whether the resultant statistics are worth the great labour and expense of compiling them." We need not add any words of our own to this confession of " partial failure." We think we may safely deduct ten per cent from the percentage of persons interested in land shown in the Census Report of 1891. We are as sure as we are of our own existence that at least ten per cent. of those shown as agriculturists are no more agriculturists than they are biologists or spiritualists, and if we deduct the number of these according to the lowest estimate, from the estimated percentage of 61.4, then the balance will, it is clear, be somewhere about fifty percent, or half the population, as asserted by the British Indian Association.

Nor is this all: We think for our present purpose, we may safely exclude the Dacca, and the Chittagong Divisions, and our authority for doing so is no other than His Honour the Lieutenant-Governor himself. In the course of the speech delivered by Sir Charles Elliott at Dacca in July 1894, His Honour said:—"The object of Government was to deal with the case of the silted-up rivers and water channels which have ceased to perform their old functions and no longer carry off the rain-water in a continuous stream. There were many of these in Central Bengal and specially in Burdwan, Hughli, Nadiya, Jessore and Khoolna." We think we may

Dacca speech that the districts named above are those that will be specially affected by the Act. Now let us see the percentage of persons interested in land as compared with the total population in each of those five districts.

	Population.	Interested in land.	Percentage.
Burdwan ...	1,391,880	757,899	54
Hughli ...	1,076,710	570,156	52
Nadiya ...	1,644,104	770,399	46
Jessore ...	1,888,827	1,235,114	60
Khoolna ...	1,177,652	827,197	70

These percentages give an average of 56 per cent. and if we deduct five or six per cent. from this figure on account of defective classification, then the balance will be somewhere near 50 per cent. Again, if we take the fingures for the two Divisions containing the five Districts named above, we find the following:—

	Total population.	Interested in land.	Percentage.
Burdwan Division...	7,688,818	3,963,609	51
Presidency Division	8,535,126	4,195,630	49

This gives an average of exactly 50 per cent. and if the deductions referred to above are made, then the number dwindles into something less than half. As regards Rajshahi, the percentage is no doubt more than half, but this may be due either to defective classification or to some cause peculiar to that Division. His Honour says that only five per cent. of the population will be exempted. Now, even assuming that the census figures are cerrect, and that the proportion which the landed classes bear to the general population is, as we have shown above, 61.8, we submit that his Honour's estimate of the percentage of persons to be exempted will still be capable of very considerable enhancement. The difference between five and thirty-nine is certainly most remarkable.

We now leave it to the public to judge whether in stating that the number of agriculturists is barely half of the total population, the Association had been guilty of "rashness" or of making a statement without verifying it.

But then, says Mr. Risley, even his own percentage of 78 "understates the case for the simple reason that people whose caste occupation is none-agricultural but who also cultivate, get recorded as non-agriculturists." We have already stated our firm conviction that the reverse is precisely the case—that persons, who are not agriculturists in the strict sense of the term but who happen to possess a few paternal acres, get recorded as agriculturists In his Census Report of 1891, Mr. O'Donnell explains that "land-occupants have been taken to include not only landlords in the English sense but all persons who possess land on a permanent tenure and free of rent,"—even though, we may add, a good many of them might follow other occupations. It will therefore be seen that the Census figures, if anything, rather over-state the number of persons interested in land, including as they do, many who are but nominally interested in land and who are certainly not agriculturists in any sense of the term.

Here we may observe in passing that according to the table given in page 94 of Mr. Baines's last Census Report the proportion of landlords and tenants to the general population is 52.98. It is true that Mr. Baines's estimate refers to the population of the whole of India, but this fact hardly affects our contention as Mr. Baines in another place records his conclusion that "on the whole the component parts of the society considered as an economic unit are wonderfully uniform throughout India.

We have, we trust, conclusively shown that the number of persons interested in land is rather below, than over, half the population. But it may be asked,—how could Mr. Risley have calculated the percentage as 78? Mr. Risley has however not explained how he had arrived at this figure, but we suspect that his estimate has been swollen to 78 per cent by the inclusion of field-labourers, cattle- breeders, crop-watchers, cow-keepers, smiths, masons and others, too numerous to be mentioned here, who are certainly not agriculturists—whatever else they might be. We must stop here to-day, confidently leaving the issue in the hands of the public. It is for the public to say whether the British Indian Association has been guilty of making "rash" or reckless statements without taking the trouble of verifying them.

III

(Hindoo Patriot, August 9, *1895.)*

WE are sure that neither His Honour the Lieutenant-Governor nor Mr. Risley has taken the trouble to read all the letters which the British Indian Association has addressed to Government embodying its objections to the Sanitary Drainage Bill. For, if either Sir Charles Elliott or his Secretary had done so, then the attack which was made upon the Association last Saturday in the Council Chamber would not have been made. It is indeed most unfortunate that Mr. Risley of all men should have placed himself in a false position and thereby misled the council, but fortunately the British Indian Association is strong enough to defend itself from the insinuations which have been so "recklessly" made against it. We shall first take up Mr. Risley's attack which was, curiously enough, confined to the last letter of the Association. If Mr. Risley had taken the trouble to read the first letter of the Association on the Drainage Bill, which was addressed to Government in the beginning of July 1894, we are sure a good portion of his speech would have remained undelivered.

We now proceed to deal with Mr. Risley's charges and " grievance" *seriatim.* The first charge against the Association is that the Associa- has unfairly asserted that the alterations made in the Bill, so far from "modifying the Bill in a way which would remove the more serious objections to the measure" only " expose it to much greater objection than before." Referring to this statement Mr. Risley declares that it sounds dreadful, but is only a stock sort of phrase which bears no relation whatever to the facts." He then goes on to point out that one of the most important of the changes made in the Bill is that the power of taking the initiative has been transferred from the Government to the District Board and he cannot understand why the Association should not have hailed this change as being of a most beneficent character. If Mr. Risley had read the first letter of the Association, he would have known why the Association could not be expected to look with favour upon this change. In that letter the Association thus recorded its opinion of the District Boards :—"Government has year after year directed the attention of District Boards to the necessity of spending a part of their funds in sanitary works, but without avail. From the very nature of their constitution, they hardly feel any interest in the matter. In several districts landholders who have the largest stake in the district are not members of the Board, and the majority of members are either local pleaders or absentee landholders, who are quite ignorant of the condition and requirements of the cultivating classes in the district. So long as District Boards are not composed mostly of intelligent and educated landholders who manage their own estates, they would hardly be able to devote to the consideration of the questions connected with sanitation and improvement of land, that intimate knowledge of the condition and requirements of the people and of their ability or inability to bear the cost of a proposed work which is essential for their right determination. The original scheme of Local Self-Government fully recognised the value of local knowledge and experience in matters of sanitation. Instead of vesting the District Boards or Sub-Divisional Boards with authority to initiate and carry out sanitary works it entrusted such works to the care of Union Committees composed of a number of the villagers themselves. In a large majority of cases the sanitary improvement of villages might be effected not by extensive drainage schemes involving a heavy expenditure, but by the construction of small water-courses and other works, and it is the villagers themselves who are the best judges of the necessity of such works." The British Indian Association therefore cannot but look upon the change referred to by Mr. Risley as one decidedly for the worse and perhaps he will now have the candour to admit that, viewing the question from its own standpoint, the Association is perfectly justified in asserting that the alterations introduced in the Bill are such as are calculated to "expose it to much greater objection than before." We think we have now successfully disposed of Mr. Risley's first charge.

We next come to the second charge against the Association. Mr. Risley asks—"Can anything be more crude than the fashion in which the Association lump together a number of Acts with no attempt at serious argument?" Here again we must refer Mr. Risley to the Association's first letter in which the sections of the Acts have been cited and their substance quoted. In that letter the Association observes:—"The Committee of the British Indian Association are of opinion that there is at present ample provision in the Indian Statue Book for the drainage of land either for agricultural or sanitary purposes. The Cess Act. 1880, section 109, and the Bengal Embankment Act, 1885, section 79, give ample power to the District Collector for the construction of new water-courses or drainage-channels and for the clearance and maintenance of old water-courses, independently of the wishes of landholders and their raiyats, and, evidently in spite of their opposition. There is also the general Drainage Law of 1880 based upon the experience gained by the operation of the special and local Act 1870. It is no doubt true that few drainage works have been undertaken under the Cess Act and the Embankment Act. The cause is not far to seek. Neither tha District Officers nor the District Boards have that intimate knowledge of the conditions and requirements of the people which could enable them to undertake such works."

As regards the Local Self-Government Act, referred to in the Association's last letter, we have repeatedly shown in these columns that section 87 of that Act enjoins upon the District Board the duty of providing for the "proper sanitation of its District." What then becomes of the charge of umping together of a multiplicity of Acts? The fact is the Association had criticised the Bill in detail, quoting chapter and verse in support of its arguments, in its first two letters, while the letter upon which Mr. Risley's attack upon the Association is based, was the last of the series, and for obvious reasons, it was not thought necessary to repeat therein the arguments embodied in the two preceeding letters. If Mr. Risley had seen those letters before rushing forth to attack the Association, then he would have found that his second charge was a most groundless one. In our last Monday's article we have disposed of the argument of Babu Surendranath Banerjee which Mr. Risley, driven by sheer necessity, had appropriated, namely, whereas the Acts cited by the British Indian Association refer to agricultural improvement, the new Act refers to sanitary improvement. We have shown that this argument is vitiated by the fact that section 87 of the Local Self-Government Act *does* deal with sanitation and that even if the case were otherwise, it would still be a debateable point as to whether the distinction drawn between sanitary and agricultural improvement was not wholly imaginary. We need not therefore say anything more on this point here.

Having thus disposed of the first two paragraphs of the Association's letter—with what success it is for the public to judge—Mr. Risley goes on to say that the third paragraph of the Association's letter may pass for the moment, but he threatens to have something to say on it later on. Now this paragraph dwells upon the phenomenal poverty of the people and points out that if a fresh tax is imposed upon the people then the remedy will prove worse than the disease inasmuch as it will reduce their means of maintaining themselves and of providing themselves with food and clothing in health and disease and thus predispose them more than ever to the attacks of the fever against which the drainage is intended to be a protection. The authorized report of Mr. Risley's speech not having yet been published, we are precluded from dealing with his observations on this point as we do not know what he said " later on" in controverting the contention of the Association. But surely he does not mean to deny the poverty of the people. Such a denial is out of the question after the discovery made by Lord Cromer that the average annual income per head of the people of India does not exceed 27 Rupees and that made by Sir William Hunter that a very large proportion of the people of this country live upon a single meal a day. Unfortunately for Mr. Risley, facts are rather stubborn things which cannot be blinked out of existence or explained away.

We next come to the fourth paragraph of the Association's letter, which contains the statement that barely half the population are connected with agriculture. Mr. Risley characterizes this statement as " curiously inaccurate" but we have conclusively proved in the article which appeared in our issue of last Wednesday that it is not the estimate of 50 per cent made by the British Indian Association but that of 78 per cent made by Mr. Risley himself which is "curiously inaccurate." Having already "exposed" this wondrous inaccuracy, we are content to leave the issue to the verdict of the public. Lastly in refutation of the statement made by the British Indian Association that the people do not want drainage, Mr. Risby puts forward the "high authority" of Babu Surendra Nath Banerjee who differs from the Association on this point. It may be very convenient for the authors of the Bill to disclaim their responsibility for the measure by making a scape-goat of the member for the Calcutta Corporation, who is as high an authority on drainage in Bengal as he is on duelling in France. But may we enquire since when the present Government of Bengal has begun to accept the hon'ble gentleman as an infallible authority in such matters even when the opinion of the oracle is repudiated by the whole nation from one end of the country to the other? What was the year, the month, the day and the hour when this miraculous process of conversion began? But how will Mr. Risley get over the fact that even Babu Surendra Nath was as firmly opposed to the passing of the Bill as any of the other elected members? It is very "curious" that the "high authority" of the hon'ble gentleman should be implicitly accepted on one point and contemptuously spurned on the other! Well may Babu Surendranath exclaim addressing Government—

> Perhaps 'twas well to dissemble your love,
> But why did you kick me down stairs?

The responsibility for the measure is fastened upon Babu Surendranath, but when he declares himself opposed to it, he is told to keep quiet. This is the reward which a man gets for allowing himself to be made a cat's paw of by our modern rulers.

We next come to the reflections passed by His Honour the Lieutenant-Governor upon the British Indian Association. His Honour said:—"That a good deal of error existed on this subject was shown by the letter of the British Indian Association who had the rashness to assert that the agriculturists on whom the rate would fall formed barely half of the population. The gentleman who wrote that letter could not have consulted the Census returns and must have taken his figures from some other source. His Honour thought he had recently seen this statement in a newspaper article, and it may have been taken from that source without any attempt to verify that statement." Again—"It was important to impress upon the Association and other public bodies who addressed the Council that if they want to do their best and honestly to assist the Government they must first learn to verify their facts." The public have, however, now seen whether it is the British Indian Association or the Govern ment of Bengal that has yet to learn to verify its facts and whether the reflections passed by His Honour are not more applicable to his Secretary than to the Association.

A Lieutenant-Governor ought not to censure a public body of the position and traditions of the British Indian Association without taking the trouble to " verify his facts." The Association will surely survive this attack, as it has survived more formidable attacks than this in the past.

We cannot but think that the hon'ble Mr. Risley was extremely ill-advised—if indeed he took advise on the subject—in making his unprovoked attack on the British Indian Association. Every one knows what happened to Don Quixote when he started to till with wind-mills ; and that piece of history may one of these days repeat itself. The British Indian Association is an ancient and stable institution which represents the most important interests in Bengal, and represents them worthily. It existed long before Mr. Risley came to the front and will exist long after he has ceased to be heard of. He has now thrown down the gauntlet and challenged the Association to battle. It will not be slow to take the challenge up. What is a Secretary more or less against a body so thoroughly representative in the best sense of the word—as the British Indian Association ? What is a smart speech in Council against the sustained argument which the Association can bring to bear ? Mr. Risley has found it easy to demolish a mere phrase-monger like Babu Surendranath Banerjee—a man full of words, who does not know the realities which should be behind the words. Babu Surendranath he has reduced to powder and has blown the powder away. There is nothing left. There never was much. But the British Indian Association is a bigger thing to tackle. Mr. Risley has sown the wind. Let him look out for the whirlwind.

IV

(Hindoo Patriot, August 10, *1895.)*

In his Dacca speech in July 1894, His Honour the Lieutenant-Governor said that the object of Government in introducing the Sanitary Drainage Bill was to " deal with the case of the silted-up rivers and water-channels which have ceased to perform their old functions and no longer carry off the rain water in a continuous stream." We are afraid that when Sir Charles Elliott announced his intention of dealing with the case of silted up rivers, he had a very inadequate conception of the magnitude of the task which he proposed to impose upon himself. The silting up of the rivers of Bengal is due to causes the removal of which is almost beyond the wit of man, and as the process has gone on in the past, so it will go in the future. When one bears in mind that according to authoritative estimate, at least forty thousand millions cubic feet of soil are deposited yearly in the bed of the sea from the united waters of the rivers in Bengal, one need not be astonished at the silting up and deterioration of those rivers, caused by the advancement of the Sand Heads further and further to the South. But to prevent this silting up and deterioration of the Bengal rivers, it is necessary to institute an inquiry into the causes of the silting up of the rivers and to devise such measures as may suggest themselves as being likely to remove those causes or to make them inoperative by neutralizing their effect. It will not do to grope in the dark and we must remember that when the blind leads the blind, both fall into the ditch. If then Sir Charles Elliott really wishes to deal with silted up rivers, his first course ought to be to appoint a Commission to thoroughly investigate into and report upon the whole question of the silting up of the Bengal rivers. Until the matter is examined by a Commission, the Government can do nothing more than grope in the dark, and while this may be sport to individual members of Government, it is death to those who will have to pay for the experiment.

In this connection we may state for the information of the public—Sir Charles Elliott and his faithful lieutenants not excepted—that more than forty years ago, a Committee was appointed by the Government to enquire into the state of the river Hughly, as fears had been expressed by the public in general that the river was yearly becoming more shallow below Calcutta and that ships arriving from sea had greater difficulties then, than formerly, in reaching Calcutta. The Committee submitted an exhaustive report on the subject in which they said :— "It is difficult to understand how a river into the channels of which, like the Hughly, such enormous quantities of earthy matter are annually poured and deposited, can do otherwise than deteriorate, if totally left to its natural agencies, however gradual or slow the process may be." Four or five years latter, Captain Sherwill, Revenue Surveyor and Boundary Commissioner, published some notes relative to the rivers of Bengal, and more especially to the feeders of the Hughly. He pointed out the great changes that had taken place in the Hughly river above Calcutta, and maintained that the process of silting up was very rapidly proceeding in the beds of the Bhagirathi and the Jellinghi and that it must of necessity continue to do so, as long as the Sand Heads advanced further into the sea. According to Captain Sherwill, the general inclination of the country towards the south-east or towards the centre of the Deltaic basin also affects the river Bhagirathi, as the water from the Ganges has a greater inclination to proceed straight on in its south-east course, rather than turn into the Bhagirathi and flow down in a due easterly direction. The vast quantity of dry soil that is blown down from the higher lands during the season of the prevailing hot winds or from February to June, and the soil that is washed down during the rainy season, or from June to September both combined, also assist to fill up the bed of the Bhagirathi. Indeed the advancement of the Stand Heads seaward, would have been more rapid than it has actually been, had it not been for the fact, as conjectured by Captain Sherwill, that a great portion of the silt of the Ganges is precipitated into the " Swatch of no ground," the supposed great volcanic rent, in which no bottom is obtained at 300 fathoms. He is also of opinion that in the great deltaic basin, there appears to be a tendency for all the rivers of Bengal to reach this unfathomable spot, as is plainly indicated by the general direction of the rivers and by the sand banks under the sea, as ascertained by actual soundings. As regards the Nadia rivers, all that is known about them is that they are very shallow. Captain Sherwill recommended that a series of levels from Rampore Beauliah on the Ganges, at the apex of the Delta to the Sandheads; cross levels from Chittagong to Tumlook and from Dacca to Moorshedabad should be carried out with mathematical precision. He was convinced that the North and South levels would prove that the beds of the Bhagirathi and the Jellinghi being much higher than the bed of the Ganges during its low-water level from the mouth of the Bhagirathi to

Rompore Beauliah, all attempts at remedying the Nadia rivers would be found to be labour thrown away and money expended to no purpose.

Now, we should like to know, what steps have been taken to carry out the measures recommended by Captain Sherwill. The year in which his "Notes' were published was the year of the Indian Mutiny, and it is very likely that the matter was lost sight of for some time. But nearly forty years have elapsed since then, and we are very curious to know whether any progress has been made during these years in the direction recommended by Captain Sherwill. But however divided opinion may be on other points there can be no doubt that the silting up of the rivers of Bengal has gone on for ages in the past and will very likely go on till the end of the chapter. It is due to the operation of natural laws which human ingenuity can hardly avert, but before Sir Charles Elliott forces upon the people any ambitious scheme for dealing with the case of the silted up rivers of Bengal, we submit that a Commission should be appointed to enquire into and report upon the whole question. Another consideration which suggests itself in this connection is that the work of dealing with silted up rivers is more an Imperial than a Provincial one and that consequently the cost of any measure of a protective character, which may be determined upon, should be a charge upon the Imperial and not upon the Provincial revenues.

We respectfully submit these suggestions for His Honour's consideration.

V ✓

(Hindoo Patriot, August 12, *1895.)*

Sir Charles Elliott in justifying the Drainage Bill has often remarked that malaria is due to a special bacillus, bred chiefly in low lying parts where there is much decaying vegetable matter. He is of opinion that it spreads to other healthier parts through human agency, and that it is mainly caused by the slow drying up of stagnant pools and marshes. In other words, His Honour is inclined to the opinion held by certain eminent authorities that the primary cause of malaria is obstruction of drainage. In his speech at the last meeting of the Bengal Council, the hon'ble Mr. Risley said :—"There is ample evidence to show that the unknown cause of malarial fever—whatever it may be—is as a rule associated with stagnant water, with the obstruction of natural drainage. Where the water is moving and alive—though it may move too slowly for you to see it move—there you have no malaria." It will be seen that both His Honour the Lieutenant-Governor and Mr. Risley are quite positive that malaria is caused by obstructed drainage. On the other hand, the British Indian Association does not accept this theory, though at the some time it modestly abstains from advancing any rival theory of its own in a matter on which doctors *do* differ so widely. In its letter dated the 27th ultimo, the Association says :—" The necessity of the measure becomes still more doubtful when it is considered that competent professional opinion is divided on the question of the utility of drainage works in improving sanitation and that in fact a large majority is in favour of the opinion recorded by Colonel Haig :—' I do not look upon drainage *per se* as a complete cure or even as principal means of cure for the fever which has so desolated the Hughly and Burdwan districts and unless some great and fundamental change takes place in the present conditions of agriculture and population, the elements of the disease will, I believe, remain, though it may be with diminished force, in spite of drainage, and in the absence of other remedial measures, may again lead to similar mortality.' This was corroborated by Dr. Lethbridge, Dr. Saunders and other responsible officers of Government."

Now let us see which of these authorities is likely to be correct, the Government of Bengal, or the British Indian Association. Here we must take a retrospective view, and we think it will be sufficient for our purpose to go back to the early sixties when fever of a very severe and fatal type began to rage in Jessore and Nadiya, and caused much consternation and havoc in several parts of those districts.

It gradually spread to the northern parts of 24-Pargannahs and in 1864-65 crossed the Hughly and appeared in the northern portion of the Hughly dis-district. In 1866 it appeared in the eastern and southern parts of the Burdwan District. During 1867-68 it continued to prevail and spread in these districts along the course of the Damooda river, and in 1869 the town of Burdwan was attacked and many places in both districts suffered severely. In 1871 fever broke out with renewed violence and was more wide-spread and fatal than ever. It also extended to those parts of Beerbhoom and Midnapore which border on the Burdwan and Hughly districts. The disease commenced in July and continued to cause most serious sickness and mortality throughout the whole of the cold season of 1871-72. The year 1871 closed with the epidemic in full sway throughout almost the whole of the portions of Beerboom and Midnapore already indicated.

Referring to the abnormal prevalence of fever, Sir George Campbell in his Administration Report for 1872-73 writes:—"Hitherto the severe fever which has been prevailing in these districts of the Presidency and Burdwan Divisions during the last ten years has been unanimously considered to be an aggravated form of malarious fever. Several theories have been held as to the cause of the special virulence of its type. Dr. Elliott and the special Commission appointed some years ago were inclined to attribute this to insanitary conditions, filth, over-grown jungles &c. This idea has been exploded because the fever has been found to maintain no constant relation to the degree of filth &c. The hon'ble Babu Degumber Mitter has strenuously maintained that the special virulence is due to obstructed drainage. His data have been called in question by others, and though obstructed drainage cannot be otherwise than pernicious, it is by no means certain that every instance of outbreak of this fever coincides with, or follows the construction of a road, railway or embankment. The opposite has indeed been pointed out both by Engineers and Civilians. Another view attributes the special severity of the type of fever to the natural deltaic changes, unequal subsidence or elevation of the Gangetic delta or spontaneous siltings of water-courses. The gradual progress of the disease westward is claimed as a stong evidence in favour of this view. Colonel Haig, in an able note on the causation of the Burdwan and Hughly fever, endevoured to prove that the exceptional severity of type was due to over-population and destitution, to a weakened vital stamina or power of resisting disease—causes which are ever rife in these districts. More recently still the medical officers serving in Burdwan have been describing cases of typhus and typhoid fever, and some have gone so far as to say that one or other of these fevers constitutes the real epidemic and that its existence accounts for the exceptional severity of type and mortality. * * * * * Meteorological observations are also being regularly recorded but nothing has come out of them yet except that there appears to be a direct relation between the humidity of the season and amount of rainfall and the amount of fever; though in the height of the rains, and while the land remains partially or wholly covered with water, fever is comparatively in abeyance. Observations have been made in America, France, Italy and the Mauritius which go to show that periodic fevers are due to a microscopic plant of the algæ class. It has not been found possible as yet to verify this hypothesis in India." In despair, Sir George Campbell recorded his conclusion that "the *causes of this fever are still a mystery*, but renewed efforts are being made to investigate them." We are afraid they are still a mystery, the dogmatic assertions of Sir Charles Elliott and Mr. Risley to the contrary notwithstanding.

Let us quote another authority, Sir Ashley Eden, than whom an abler Lieutenant-Governor never ruled over Bengal, nor one possessed of a more thorough and intimate knowledge of this province. In the Administration Report for 1881-82. Sir Ashley Eden writes:—"A melancholy feature in the sanitary history of the year was a marked increase in mortality from fever in every part of the Province and in every district except Jessore and Dinagepur. * * * The disease was specially fatal in Nadiya where the death rate attained the very high figure of 39·72 as compared with 29·53 per thousand in the previous year, notwithstanding the deputation of a special staff of medical officers to the villages attacked and the lavish and gratuitous distribution of medicines. Towards the end of the year, a special Commission was appointed to visit the worst parts of the district and endeavour to ascertain the cause of the outbreak, and, at the same time to impress upon the Zamindars and the people the advantage of retaining a supply of pure water in their villages and of observing sanitary precautions. The members of the Commission spent the cold season in the district and their report has since been received. The *conclusion at which they have arrived on the main question is of a negative character. They have discovered no specific cause for the impression generally entertained by the people themselves that it has been brought about by artificial obstructions to the natural drainage of the country.*

To-day Sir Charles Elliott and Mr. Risley authoritatively declare that obstructed drainage is the cause of the abnormal prevalence of fever, but we have shown above that in 1872-73, Sir George Campbell had declared the cause to be enshrouded in mystery. In years later, Sir Ashley Eden, accepting the conclusion of a Commission specially appointed to investigate the matter, and composed of Dr. Lidderdale, Sanitary Commissioner, Mr. A. W. Paul, Joint-Magistrate and Mr. T. H. Wickes, Superintending Engineer, still more authoritatively declared that the theory of the prevalent disease being brought about by "artificial obstructions to the natural drainage of the country" had received its death-blow, little dreaming that, after remaining in a state of suspended animation for upwards of a decade, it would be resuscitated by one of his successors. We now leave it to the public to judge whether the Bengal Government or the British Indian Association has come nearer the mark.

VI.

(*Hindoo Patriot, August, 13, 1895.*)

YESTERDAY we showed that Sir George Campbell had declared the cause or causes of the abnormal prevalence of fever in Bengal to be "mysterious," while ten years later, Sir Ashley Eden had declared that there was no doubt that the impression that fever is caused by obstructed drainage was unfounded. In our present article we shall examine the views held on the subject by Sir Charles Elliott's immediate predecessors, Sir Steuart Bayley and Sir Rivers Thompson. Taking the latter first, we find that in 1883-84 the question of the excessive prevalence of fever in some of the districts was the subject of a patient investigation by the medical officers of the districts affected, but, as before, the conclusions arrived at were of a negative character. Of these local enquiries, mention is made by Dr. Ghose, Civil Surgeon of Bankura, and his opinion is that "soil moisture is not *per se* the cause of fever, but that so long as the contagion, whatever it might be was not introduced either by human agency or from village to village by the wind, the humidity of the soil did no harm, but the contagion, once falling on congenial ground, multiplied in abundance in proportion to the soil moisture, and caused the disease. Where the moisture in the soil, owing to the proximity of a marsh, is perennially damp, there the fever prevails the most." Dr. Ghose's opinion that soil moisture is not *per se* the cause of fever is deserving of consideration. The Civil Surgeon of Malda ascribed the prevalence of fever to the presence of filth and the violation of every sanitary law. He wrote:—"Groups of people congregated thickly together in villages surrounded by soil, sodden and saturated by the excremental discharges of years, little or no ventilation, air poisoned by the miasmatic exhalations of decaying animal and vegetable *debris* and water rendered impure by nature and art, are all quite sufficient to account for the spread, if not the origin, of disease in an Indian village." It will be seen that the latter explanation is so comprehensive as almost to inculde everything. We do not hear much of obstructed drainage during the administration of Sir Rivers Thompson.

In the Administration Report for 1886-87, we find that the District reports " repeat the same melancholy story of weakness, anæmia, enlarged spleen and liver, debilitated constitutions, pulmonary and enteric complications and other sequelæ and among the causes assigned are dense jungle, imperfect drainage, rank vegetation, bad water-supply, silting up of bils and tanks, water-logged soil, burial of dead within homesteads, vicissitudes of temperature, general uncleanliness insufficient clothing, poor food, damp and improperly-constructed houses." It will be seen that obstructed drainage was considered to be only one of the minor causes of disease. In this connection we will refer to another authority, the competence of which cannot be questioned, but the recommendations of which were, to say the least, most, extraordinary. We refer to the Army Sanitary Commission, which reviewing the Bengal Sanitary Report for 1885, proposed a scheme of organized sanitary reform. The Commission was of opinion that " the most important sanitary problems in Bengal were those connected with the population of villages." One of its proposals was that where the soil of a village had become polluted by persistent neglect of sanitary precautions, the remedy was to select " new sites for such villages, placing the sites in good sanitary state, lying down an authoritative Code of village sanitary law, with means of execution and inspection, and then removing the village by degrees." This was a rather extraordinary proposal, and the Bengal Government dismissed the Commission's ambitious scheme chiefly on the ground of cost and contented themselves " with the humbler task of doing all that their resources would allow to improve existing conditions." It is a pity that Sir Charles Elliott is more ambitious than his predecessor and would be content with no "humble" task. But then in one respect His Honour possesses an advantage over his predecessor. Unlike the latter, Sir Charles is not dismayed by the question of ways and means. His Drainage scheme is all his own—though there are several claimants for its authorship, but the cost of carrying it out will be realized from the agriculturists. If His Honour's predecessor could so light-heartedly impose tax after tax upon land then he would not have been staggered by the stupendous character of the scheme of the Army Commission.

We next come to the *regime* of Sir Steuart Bayley. The year 1888-89 was characterized by severe mortality in nearly twenty districts, and the Sanitary Commissioner, in default of a more plausible explanation, ascribed the heavy mortality to "the want of proper drainage." Sir Steuart Bayley was, however, far from convinced of the truth of the Sanitary Commissioner's explanation, and recorded his opinion that "it appears to be probable that there have been other causes at work which have contributed to this result." He pointed out that though the deterioration in Shahabad had been attributed to the obstruction of drainage caused by canals, this could not have been the cause of the deterioration in Gya, as the only canal in that district ran parallel to and close to its western boundary, while in districts like Hazaribag, Monghyr, Bhagulpore and Beerbhoom, which had hitherto been healthy, "no important changes in the condition of the drainage had, so far as was known, been introduced in recent years." Sir Steuart Bayley, after a careful consideration of the question, arrived at the following conclusion:—"The presence of these variations in districts all of which are remarkable for their heavy death-rate from fever seems to point to the operation of some more general cause than that suggested by the Sanitary Commissioner, and it is possible that the explanation may be found in the existence of a wave of malarious fever creeping gradually westwards, independently of, though not of course uninfluenced by, conditions of surface drainage." We should like to know what Sir Charles Elliott and his advisers have to say regarding this wave theory.

No one has ever denied that defective drainage can be anything but pernicious, but the question is whether it can be held to be the only, or even the principal, cause of the prevalence of disease. We have shown that in the opinion of Sir Charles Elliott's predecessors, who have held office since the outbreak of the malady over thirty years ago, obstructed drainage plays but an unimportant and insignificant part in causing disease, and we submit that no new light has been thrown on the subject during the administration of our present Lieutenant-Governor to warrant the assumption, rejected by everyone of his predecessors, that obstructed drainage is the principal cause of the prevalence of disease.

Indeed the only justification for the assumption made by Sir Charles Elliott is to be found in the opinion of Dr. Gregg, Sanitary Commissioner of Bengal, who in his report for 1891 accounted for the excessive mortality from fevers which had characterized that year by what the Sanitary Commissioner for India is constrained to characterize as " an apparent paradox." It would appear that Dr. Gregg has ascribed the heavy mortality from fevers in 1890 to *excessive* rainfall, while in the following year he ascribed the same to *deficient* rainfall. Now this *was* a paradox and no mistake and he thus reconciled or rather strove to reconcile his seemingly conflicting explanations :—" In the present defective drainage, and consequently, waterlogged condition of Bengal, there is not sufficient exit in years of heavy rainfall for the excess water which stagnates in the soil, and it is well known that stagnant moisture is a cause of malarial fevers. On the otherhand, in years of deficient rain-fall, such as the year under report, in consequence of the failure of rivers to inundate areas in the interior of the country, the drinking water sources of the large proportion of the population are not replenished and tank and other vegetation begins early to decompose and fill the air with poisonous effluvia. Surface impurities, moreover, in years of deficient rainfall, are not washed away, and in their process of decomposition add to the contamination of the atmosphere." Dr. Gregg evidently left out of account that great purifier—the Indian sun. He concluded his observations with the following assertions :—" Until drainage, a better water-supply and conservancy arrangements are initiated and the masses taught to appreciate and take an interest in them, it is hopeless to expect an appreciable reduction of the fever mortality of these low-lying provinces." Even Dr. Gregg gives a somewhat uncertain sound. He is not certain how far obstructed drainage is to be held responsible for the fever mortality, but he merely mentions it as one of the probable causes of it. In the following year, however, the Sanitary Commissioner was less vague. He wrote :—"The water-courses, which are the main drainage channels, have changed their direction and left a chain of swamps in their ancient beds. Exactly the same thing has occurred in the districts of Nadiya and Jessore, and to a lesser extent in Murshidabad ; and in the first two of these districts the population has declined by 18,687 and 50,548 respectively. Jessore and Nadiya are now seamed with the beds of extinct rivers, and the few which maintain a languid vitality during the rains, are in the dry weather a chain of fetid swamps. The evil has also, I am afraid, been intensified by the construction of railways and feeder roads with insufficient water ways, and nothing but comprehensive drainage schemes can now restore these districts to their former state of salubrity." In his report for 1893, Dr. Gregg wrote that the increased mortality " was undoubtedly due to some extent to improved registration, but it is also due to the wide prevalence of malaria which is chiefly caused by the want of drainage—is a well-known fact—and yet there are some who doubt whether the time has come when, for the preservation of the lives and the health of the people, an effective system of drainage is necessary by means of legislation. It must surely be apparent to the most casual observer that if the present water-logged condition of Bengal is allowed to continue and increase, a period will be reached, and that, too, probably in the lifetime of the present generation, when the oldest parts of the most populous and opulent province in India will have become unfit for human habitation. After an experience of 22 years spent in the study of the health of the people of Bengal, I have no hesitation in saying that the crying want of the province is improved drainage and that until this is provided there will be no diminution in the death-rate from fever, which in the present condition of things must go on increasing. The Drainage Bill, which is now before the Bengal Legislative Council, has been conceived in the truest and best interest of the people of the land, and I hope for their own good that nothing will prevent its passing into law."

We venture to think that Sir Charles Elliott's sole justification for the Drainage Bill is contained in the passages quoted above. We have already shown that Dr. Gregg has a perfect genius for startling the world with "apparent paradoxes." One year he ascribes the increase in mortality to excessive rain-fall, the next year he ascribes the same to deficient rain-fall and then to reconcile the two statements invents an explanation which certainly does credit to his imaginative faculty, though, we fear, at the expense of his reputation for common sense. Even Sir Charles Elliott, who quite unaccountably lays so much stress upon the opinion of the Sanitary Commissioner, has often openly expressed his belief that Dr. Gregg's theorizings are no doubt always ingenious but that unfortunately they are seldom found to be sound. Our authority for this assertion is the Resolution of the Bengal Government reviewing the Sanitary Commissioner's last annual report, to which attention was drawn in these columns a few weeks ago. In that resolution Mr. Risley pronounced the Sanitary Commissioner's report as being "disfigured by looseness in the handling of statistical data and a tendency to quote unconfirmed opinions in proof of doubtful propositions to an extent which seriously detracts from its value." Again referring to the Sanitary Commissioner's conclusion regarding the vital statistics. Mr. Risley characterises it as a "paradox" and later on proves it to be altogether untenable and absurd. Yet it is on the authority of this solitary medical officer that Sir Charles Elliott is going to impose a heavy burden upon land disregarding the contrary opinion of every one of his predecessors from Sir George Campbell down to Sir Steuart Bayley.

VII.

(Hindoo Patriot, August 17, *1895.)*

WE welcome Dr. Harvey's letter to the Government of Bengal on the Sanitary Drainage Bill as a most valuable contribution to the literature on the subject. However much we may differ from him in regard to some of the opinions expressed therein there can be no doubt that his letter throws much light on a subject which is little understood by laymen and as to which a very wide divergence of views is found to prevail even among scientifie men. Dr. Harvey assumes that malaria is due to a specific cause and that this cause is the plasmodium of Laveran. Now we have never denied that malaria is due to a specific cause. There can be no effect without a cause, and it is when Dr. Harvey assumes that the cause is no other than the plasmodium of Laveran that we venture to join issue with him. We submit that the cause of malaria still remains as mysterious as ever. Of the twelve medical officers whose opinions have been published as appendices to Dr. Harvey's letter, we find that four content themselves with merely agreeing with Dr. Harvey, one attributes the disease to an " earthborn poison generated in soils, four attribute it to some specific cause still undiscovered and unknown, while only one accepts Laveran's theory and two expressly reject it. It will thus be seen that the theory of

Laveran or indeed any other theory has not yet been conclusively proved.

Now, if the cause is not accurately ascertained, then how can any remedy be applied? It is not enough to say that there must be a specific cause. You must prove what that specific cause is, and a reference to the opinions of the medical authorities will show that the theory accepted by Dr. Harvey is not accepted by the majority of medical men. On this point the following observations made by Dr. Pilgrim are exactly to the point:—"While fully believing that malarial fevers are due to a *specific* cause, I do not think that the researches referred to in your paper establish beyond all doubt that the plasmodium of Laveran is the ætiological factor. Just in the same way as the specific cause has not, in my opinion, been exactly demonstrated, so too I do not think we know all the exact conditions of soil which are essential for the development of the organism, or organisms. No doubt damp and water-logged condition of the soil seems to be the most common feature of soils where malarial fevers most prevail, but malarial fevers also prevail in connection with soils in which the conditions are the very reverse of the above, viz., in chalky and granite soils that are dry and well-drained."

Dr. Harvey denies that poverty is the primary cause of malaria. But no one has said that it is. He admits that poverty makes the people predisposed to the attack of malaria. The British Indian Association has not said anything more than this. Its contention is that poverty is one of the secondary causes that make the people liable to the attack of malaria, and this is amply borne out by the opinion of almost every medical man, which accompanies Dr. Harvey's letter and is admitted by Dr. Harvey himself who says that "poverty is a purely secondary cause" and that it intensifies the acion of malaria. Colonel Haig, whom we have often quoted in these columns, writes :—"The excessive mortality must be due to the failing stamina of the population generally, to a degeneration and loss of vital energy which render them less capable of resisting the morbific influences to which they have always been exposed." Dr. Bomford, Principal of the Calcutta Medical College, indeed goes so far as to say that "poverty in its turn from whatever cause it may arise, brings about a great increase in the mortality and may have more to do with the excessive mortality in certain years than malaria. If it could be shown that the Drainage Bill is likely to still further impoverish the lower strata of the people, no body would, I presume, advocate its adoption." So, on this point, the Association's assertion remains unshaken.

Dr. Harvey is of opinion that "a damp or water-logged soil, whether from defective or obstructed drainage, forms a most favourable nidus for the development and intensification of the (malaria) germ." Now this opinion does not seem to be strengthened by the statement made by Dr. Pilgrim that "malarial fevers also prevail in chalky and granite soils that are dry and well-drained." Again, according to Dr. De Fabeck, who was Sanitary Commissioner for Bengal in 1882-83, it is not damp soil but rather water which forms a favourable nidus for the development of the germ. He says:—"If the malarial agency has its origin, as there seems every reason to conclude it has, in a humid nidus, the deduction is inevitable that it must exist in some form and that probably its most active one, in the water not only of districts, notorious for air-borne malarial fevers, but also in others where atmospheric agency having apparently no mephitic activity, we have the far more serious water-borne or what are sometimes called aqua-malarial fevers." We submit that improved drainage will not lead to the abatement of disease in the localities falling under the latter category.

We now proceed to examine Dr. Harvey's theory of the water-logging of the soil. It is a theory as to which medical opinion is far from unanimous. In reviewing the Sanitary Commissioner's report for the year 1881-82, the Government of Benga observes:—"The causes attributed are almost everywhere the same—impurity of drinking water, uncleanly habits of the people, and water-logging of the soil owing to obstructions to natural drainage. This last cause of disease is the one most frequently put forward by the people themselves and it has formed the subject of extensive and searching enquiry. The question is far from being settled, but the investigations that have so far been made have not hitherto tended to confirm the popular belief." It will thus be seen that the theory of the water-logging of the soil has not yet passed beyond the stage of conjecture.

Dr. Harvey says that the prevalence of malaria is intimately connected with defective drainage and that the remedy lies in improving the drainage, and he cities the case of Dinagepur in support of his contention. We are afraid the position he has taken up is an untenable one. We shall examine the case of the Dinagepur drainage later on, but we will just point out here that this contention is far from established and that improved drainage has not proved an effective remedy in a multitude of instances that readily suggest themselves to our mind. First as regards the connection between obstructed drainage and malaria. We quote the following from the report of the Sanitary Commissioner for Bengal for 1873 on the subject of the prevalence of disease in Howrah :—"Supposing that a water-logged condition of the soil could produce fever, and this has by no means been proved, it certainly could not have been the cause which originated the fever at Seebpur, or maintained it after it was originated, because the sub-soil water has been lower this year than it was in the corresponding months of any year since 1860. Again fever has been prevailing in other areas of the Howrah Municipality where no excavations have been filled up or other works carried out which could have been suspected of interfering with the drainage of the country. It might be argued, however, by those who maintain the water-logged theory, that the fever originated in Seebpur and spread by contagion to the other fever affected areas Against this opinion, however, is to be advanced the solid, substantial fact that in areas bordering on Seebpur fever has not been very prevalent,—take for instance the Howrah area; while in areas separated from Seebpur by other areas not unusually affected by fever, fever has raged and is now prevalent. This latter remark is specially applicable to Belgatchia, which is separated from Seebpur by the Howrah area." Again at one time the Burdwan fever was attributed to obstructed drainage. The Sanitary Commissioner, (Dr. Jackson) in his report for 1873, from which we have quoted above writes:—"On the whole I am of opinion from careful examination that the district of Burdwan is not badly drained; that on the contrary, it is better drained than many of its neighbours where no such prevalence of fever obtains and that the origin of this terrible fever is quite independent of, and unassociated with, faulty drainage." The following extracts taken from the Bengal Administration Report for 1876-77 further confirm the theory that the origin of the Burdwan fever is unconnected with defective drainage:—"Of Burdwan it is recorded that the disease that was distinguished by the name of Burdwan fever is a thing of the past in this district this year also. It does not appear that this is the result of improved drainage." In that year the Government was inclined to the view that "the saturation of the sub-soil in the deltaic districts of Bengal was one of the chief causes of fever" and that "this saturation might have been aggravated of late years by both natural and artificial changes"—not by obstructed drainage. The opinions we have quoted above will suffice to show (1) that faulty drainage is not exclusively or necessarily associated with the prevalence of disease and (2) that in many cases, improvement in the public health has been brought about by other means than improved drainage.

We now come to the case of Dinagepur. Dr. Harvey says:—"A very excellent illustration of excessive development of fever clearly due to obstructed drainage is given in the report of the Sanitary Commissioner, Bengal, for 1877, pages 6 and 7:—'The district of Dinagepur has long had an unenviable reputation for unhealthiness caused almost entirely by fever. * * * * When fifteen out of seventeen adult Europeans had to leave the station in a single year, broken by repeated attacks of fever, and official business could hardly be carried on, a Committee was appointed by Government to report on the causes of this great unhealthiness and suggest means for improving the station. The Committee recommended a number of general sanitary reforms, such as improved conservancy, better means of disposing of the dead, &c., but their main reliance for the improvement of the public health was a new drainage scheme by which the river was completely dammed up, and the waters of the small stream with the town drainage carried by a new cut seven miles lower down the river. The project was put in hand shortly afterwards and was practically completed in 1879. I am informed by Mr. Nolan, Commissioner of the Division, that the results have been excellent on the whole, and that the general health has greatly improved.' "

Dr. Harvey labours under a delusion in thinking that improved drainage has at all led to any sanitary improvement in the District of Dinagepur, or rather to be more accurate, at the station of Dinagepur, for the Sanitary Commissioner's description quoted by Dr. Harvey applied only to the station of Dinagepur and the drainage work in question was also carried out in the Dinagepur town. Now would the reader believe it the improvement in the sanitation of the town of Dinagepur could not possibly be attributed to improved drainage, for the simple reason that it had taken place *before* the drainage work was taken in hand? In the Bengal Administration Report for the year 1878-79 we find the following significant admission, in reference to the improvement in the sanitation of the town of Dinagepur:—"Meanwhile before the contemplated measures (drainage) could be adopted, the health of the town suddenly improved and during the year under review the mortality has been small and the condition of the people is already much better." Now this improvement took place before the drainage scheme had been carried out. In another place the sudden sanitary improvement of the town of Dinagepur is attributed to "more favourable climatic conditions of which we know nothing." Dr. Lidderdale in his Sanitary Report for 1883 writes on the same subject as follows:—

"The effect of the drainage scheme on the health of the town of Dinagepur commenced in 1879 on the recommendation of the Committee appointed to enquire into the causes of great unhealthiness of the place, and completed in 1881, may be judged

	Ratio per mille from fever.
Mean mortality for 1874 to 1878	12·44
Mortality in—	
1879 ...	... 14·10
1880 ...	... 14·71
1881 ...	... 12·02
1882 ...	... 13·69
1883 ...	... 17·11

by the figures given in the margin. I am not at present prepared to say that the scheme has fulfilled the hopes of its originators." It will be seen that the average mortality from fever during the years 1874-78, that is, before the commencement of the drainage work, was 12.44. But after the completion of the drainage the mortality has exceeded this proportion in every succeeding year except one. And what is the latest mortality from fever in the town of Dinagepur which has had conferred upon it the priceless blessing of so-called improved drainage? In 1892 it was 29.58, and in the following year it diminished to 21.87, while the average mortality in the pre-drainage years 1874-78 was only 12.44 per mille. We are sure that Dr. Harvey, now that these facts have been brought to his notice, will himself admit that in relying upon the Dinagepur case he has relied upon a very broken reed indeed.

We have pointed out that in the opinion of many competent authorities, there is nothing to show that obstructed drainage is necessarily associated with the prevalence of disease or that improved drainage is sure to lead to an abatement of the disease. Now we shall show that drainage is not necessarily an unalloyed blessing, and for our purpose it will be sufficient to quote here what Dr. Bomford writes on the subject :—

" There is evidence that irrigated land has a high fever mortality, whatever this fever mortality may really be,—*vide* on this point the report of the Sanitary Commissioner of the North-Western Provinces for 1887,—and also that the mortality from fevers in any particular district of the North-Western Provinces varies as a rule directly as the rainfall. On the other hand, the Sanitary Commissioner of Bengal was forced to admit in his report for 1891 that fever had been unusually prevalent in a year of deficient rainfall, and his explanation of this apparent paradox has some bearing on the present enquiry, because it raises the question whether drainage might not, under certain circumstances, actually increase the mortality. If by drainage we bring about the condition described by him as the result of deficient rainfall, it might do harm instead of good. Supposing that malaria acts rather by impoverishing and enfeebling the people and is not so much a direct cause of mortality, and for the view there is considerable evidence in what we see every day in our hospitals, then the immediate effect of drainage might be to bring about conditions which would act adversely upon the already impoverished and enfeebled people, although eventually it might by checking malaria improve the general health, and so enable a new generation of people to withstand the evil effects of both floods and droughts. I do not think that there is any real difference among medical men on these matters, but few have made a special study of these questions and know how complicated they are, especially in India." We commend these observations to the attention of the Government of Bengal.

A host of medical authorities, amongst whom may be mentioned the name of Dr. Crombie, are unanimous in their opinion that the silting up of rivers owing to natural causes is the primary cause of sub-soil moisture which cannot therefore be got rid of by means of improved drainage. According to Dr. Bomford drainage may have the same adverse effect upon the health of the people affected, as a deficient rain-fall ; such being the case, we submit Government is not justified in attributing the prevalence of disease chiefly to obstructed drainage or to embark upon costly schemes of drainage which may not only have an adverse effect upon the health of those for whose benefit they are intended, but by diminishing the means of the people and increasing their poverty may also make them more predisposed to the attack of the disease than is now the case. Whether obstructed drainage may be called a secondary cause of disease is a point on which, even Dr. Harvey will admit, medical opinion is not unanimous. But that poverty, is a secondary cause, diminishing the protection of the people from disease and making them liable to its attack, is a self-evident proposition which must command universal assent. Is Government then justified in taking a very big jump into the unknown, in courting a certain danger to avoid an imaginary one? In the present uncertain state of our knowledge of the cause of malaria, we submit, in the words of Dr. Simpson, that what is now wanted is an enquiry into the whole question and that it is only after such an enquiry that "people will be in a position to say whether a Drainage Bill of the character proposed is necessary, and if necessary, in what districts." We trust Government will give us credit for being animated by the same high motives which inspire itself, and if then we have felt it our duty to offer a firm, consistent and uncompromising opposition to the measure in question—it is not because we love Government less, but because we love the interests and the well-being of our countrymen a great deal more.

VIII.

(Hindoo Patriot, August 19, *1895.)*

We have not seen a weaker attempt at a refutation of a serious argument than that made by His Honour the Lieutenant-Governor of Bengal and Mr. Risley to meet the objection, on the score of the Permanent Settlement, to the Sanitary Drainage Bill, advanced by the British Indian Association. It has always been a blot on our administration and a misfortune to the people that as regards several questions of personal rights and rights of property the interpretation of laws finally rests with officers innocent of any legal training. The misfortune is the greater when the law to be construed is one which involves a pledge or contract, on the presumed inviolability of which vast sums of money have been spent for over a century and the foundations of immensely valuable property have been laid, and also one which can not be construed adversely to the party claiming such vested rights without an infraction of the principle that a man should not be the judge in his own case. There would have some justification for the plea that the imposition of a cess for the purposes of sanitary drainage is not a breach of the Permanent Settlement if it had been supported by the opinions of others than officers of Government. But there is not only no independent opinion which supports the theory of Government but even their own responsible officers, who have held some of the highest appointments in the State, and who are qualified to speak with authority on the question, have given opinions contrary to the theory of Government, not less decided and unequivocal than those pronounced by the staunchest advocates of Zamindari interest.

Sir Richard Garth, *Kt.*, late Chief Justice of the High Court, Bengal, viewed " with horror and dismay the revolutionary provisions of the Bengal

Tenancy Bill" which sought to reduce the profits of the Zamindars and observed that "it seems to me inconsistent with the good faith of British nation, which the native community have hitherto had reason to respect, to deprive the Zamindars of the rights and position which they have acquired under the Permanent Settlement." Sir Barnes Peacock *Kt.*, in his famous minute on the Village Watch Bill remarked :—"It is clear that according to the engagement entered into at the time of the Permanent Settlement, the *jumma* then fixed cannot be altered It was declared by the Governor-General in Council that the Zamindars and other propriеors of land and their heir would be allowed to thold their estates at such assessment for ever, (see Regulation 1 of 1793, Sec. 4), and that the orders fixing the amount were to be considered irrevocable and not liable to alteration by any persons whom the Court of Directors might appoint to the administration of the affairs of the Company (Sec. 7.) At the conclusion of the Permanent Settlement, the Governor-General in Council expressed his confidence that the proprietors of land, sensible of the benefits conferred upon them by the public assessment being fixed for ever, would exert themselves in the cultivation of their lands under the certainty that they would enjoy exclusively the fruits of their own good management and industry and that no demand would ever be made upon them for an augmentation of the assessment, in consequence of their estates. (Reg. 1 of 1793, Sec., 7.) The same principle which prevents an augmentation of the assessment equally precludes the taxation of the owners in respect of the rent or produce of their estates."

The opinions pronounced by the Members of the Council of the Secretary of State for India on the occasion of the imposition of the Road Cess were not less definite and unequivocal. Sir Erskine Perry said: "The language and acts of Lord Cornwallis and the Government were so distinct, solemn, and unambiguous that it would be a direct violation of British faith to impose special taxes in the manner proposed." Sir Frederick Halliday said: "To affirm that the right to impose these taxes, in the face of the promises of the Permanent Settlement, had already been ruled and decided in the case of the Income-tax, is as much as to say, that, because in 1860 a general tax was temporarily imposed affecting all classes, therefore a special tax may now be permanently levied on one class only, although that class has been solemnly assured that no new tax and arbitrary exaction shall ever be laid upon it.' Mr. H. T. Prinsep said:—"The policy inaugurated and the measure sanctioned will shake the confidence hitherto felt in the honesty and good faith of the Government." Mr. R. D. Mangles said:— "We have no standing-ground in India except brute force, if we forfeit our character for truth." Sir Frederick Currie said:—"The plea that these territorial obligations cannot be met by the Imperial revenue, is a cogent reason for retrenchment and economy, but it cannot justify our levying a special tax on the Zamindars of Bengal, to do which would be a breach of faith and the violation of the statutory engagement made at the Permanent Settlement.

Such being the opinions of eminent judges, lawyers and statesmen, the spectacle presented by His Honour the Lieutenant-Governor and the Official Members of the Bengal Council putting their own interpretation upon the engagement made with the Zaminders in 1793 is to say the least not edifying. We once more beseech our rulers to show more consideration for the pledged word and character of the British nation and more compassion for the already wronged Zamindars of Bengal and Bihar. Would that our rulers could realise for a moment the dangers which Lord Cornwallis sought to avert by a Permanent Settlement of the land revenue and the benefits which have been conferred by that settlement. We shall let Government itself speak on the point. "The Bengal of to-day offers a startling contrast to the Bengal of 1793; the wealth and prosperity of the country have marvellously increased—increased beyond all precedent, under the Permanent Settlement. . . . .

. . . A great portion of this increase is due to the Zamindary body as a whole, and they have been very active and powerful factors in the development of this prosperity." (*Vide* Report of the Commissioner of Burdwan, *Gazette of India*, 20th October, 1883.) If after all this, our rulers were still to argue that since the Road Cess has already been imposed, there is no obstacle in the way of imposing a fresh cess and that a wrong once committed warrants the commission of fresh wrongs, all that we could say is that—woe to the country whose ruling power after having got all the benefits and advantages which a certain measure was intended to confer does not hesitate to break faith and encroach on the vested rights of a body of loyal but helpless and powerless subjects. We do not envy Government the satisfaction which wrenching a few lacs or crores of rupees from them might cause to it. Nor do we regard such an act as a glorious feat of administrative ability. The decision of the great question now rests with His Excellency the Viceroy. We still hope that His Excellency will not make light of the important objections raised by the British Indian Association, the Maharaja of Durbhanga and the elected members of the Bengal Council.

IX.

(Hindoo Patriot, August 24, 1895.)

BACON in his immortal work, the *Novum Organum*, referring to the *Idols of the Forum*, points out that under certain circumstances "a false and improper imposition of words strangely possesses the understanding" of men. He truly observes that even "the definition and explanations, wherewith men of learning, in some cases, preserve and vindicate themselves," do not in any way "repair the injury" for the simple but sufficient reason that "words absolutely force the understanding, put all things in confusion and lead men away to idle controversies and subtleties without number." This is no doubt specially noticeable in the domain of politics, where parties fight for meaningless shibboleths thereby showing that they care not so much for the substance as for the shadow.

The controversy which has so ceaselessly raged for sometime around the Sanitary Drainage Bill affords admirable illustration of the potency of words—"mere words"—in "forcing" the "understanding", "putting all things in confusion" and "leading men away" to interminable "subtleties." Dr. Harvey has sought to silence the opposition of the *Hindoo Patriot* to the Drainage Bill by making quotations from its own files of twenty years back, and he asserts that "the *Hindoo Patriot* itself was for a long time the chief exponent of the theory that the one essential cause of malaria was obstructed drainage." In another place referring to obstructed drainage, Dr. Harvey writes:—"No one except the late Raja Digambar Mitter and the *Hindoo Patriot* of the time of Dr. Lethbridge's Committee asserts that it is the sole cause of malaria." Dr. Harvey therefore accuses this journal of inconsistency in having in 1873 attributed malaria to obstructed drainage and then veered round in 1895 to oppose the Drainage Bill. We shall take up the insinuation of inconsistency later on, but in the mean while, we may point out that the *Hindoo Patriot* had never said that obstructed drainage was the "*sole*" cause of malaria, though it has always contended and still contends that it is one of the *principal* causes of disease. But let that pass. In their speeches in the Council Chamber, His Honour the Lieutenant-Governor and Mr. Risley also ascribed to obstructed drainage the excessive prevalence of disease.

Now, we shall presently show that the phrase "obstructed drainage" used by the late Raja Digambar Mitter in his articles in the *Hindoo Patriot* to which Dr. Harvey refers, bears a different meaning from that which has been given to it both by His Honour the Lieutenant-Governor and Mr. Risley. But before doing so, we will explain in a few words the circumstances which had led to the publication of those articles. When Sir Cecil Beadon was the Lieutenant-Governor of Bengal, the theory was started that the prevalence of malaria was due to the existence of jungles in the villages affected. This theory was practically accepted by Sir Cecil Beadon and the *fiat* went forth for the clearance of jungles from villages. This crusade against jungles was prosecuted with such unabated vigour that in Jessore, with the exception of a few cocoanut trees not a single old tree of any kind was spared. The remedy, however, proved utterly unavailing, and Sir William Grey must have lost all faith in the nostrum of his predecessor, when Mr. Adley came to his rescue and submitted a report in which he traced the disease to one and thirty different causes the foremost of which was the defective drainage of the paddy fields, *bheels* and *jullas* with which the whole country is so thickly intersected.

The object of the articles which appeared in the *Patriot* was to combat the theory of the participation of the rice fields and *jullas* in the generation of the epidemic fever and to point out that the seat of the defective drainage was in the village itself and amidst human habitations. At that time the Government rejected the theory of obstructed drainage in the village itself and contemplated to plunge the country in gigantic schemes for the drainage of the rice-fields, the *bheels* and the *jullas*, which, as the *Patriot* then showed, and Sir George Campbell was subsequently constrained to admit, had no connection whatever with the generation of disease. Mr. Adley's theory practically meant the loss of three-fourths of the cultivable land in Bengal and from a threatened calamity of such almost inconceivable magnitude, the *Patriot* strove, and let us add successfully strove, to save the country by pointing out that the cause of the disease was local and existed in the village. It pointed out that the drainage of countless villages had been obstructed by railways, roads and embankments and that disease had followed wherever such obstructions had taken place. We still maintain this theory and we submit that our opposition to the Drainage Bill is not inconsistent with our adherence to this view.

Now we shall show that what the late Raja Digambar Mitter meant by obstructed drainage in his articles in the *Patriot* was a very different thing from what is meant by the present Government of of Bengal. In his preface to the pamphlet containing the articles contributed by him to the *Patriot*, the late Raja Digambar Mitter wrote:—"What is required is not large expenditure of money, but a careful, constant minute attention of the drainage of the *villages*." Again in the article which appeared in the issue of the *Patriot* of the 9th September, 1872, the late Raja wrote:—"It should be borne in mind that when we talk of the

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Self-Government Act already authorize the removal of obstruction to drainage respectively for agricultural and for sanitary purposes In 1892-93, the total expenditure on sanitation by the District Boards in Bengal amounted to upwards of Rupees one lakh and a quarter. This money is amply sufficient for the clearance of obstruction to drainage in fever-stricken villages, such as the late Raja Digambar Mitter had advocated. But of course it is a mere drop in the ocean when a comprehensive scheme such as Sir Charles Elliott has in mind, has to be carried out.

In his speech in the Council Chamber, Mr. Risley said that the Bill had reference to " far-reaching and expensive drainage schemes." From the removal of obstruction to drainage in villages at an average cost of about a couple of hundreds per each clearance, as suggested by the late Raja to the " re-excavation of silted-up water-channels" and the " formation of new channels" and other " far-reaching and expensive drainage schemes" the difference is truly great. The fact is the late Raja's " obstructed drainage" and Sir Charles Elliott's " obstucted drainage" resemble in nothing except the name. The very moderate reform which the late Raja advocated in the columns of the *Patriot*, twenty years ago, the *Patriot* still advocates, but its advocacy cannot be extended to the wholly different projects which are contemplated in the Drainage Bill. It is the phrase "obstructed drainage" that has caused all this confusion in the mind of His Honour the Lieutenant-Governor and for the sake of a mere phrase which has no reality, or at most a confused idea, behind it, a grievous burden is to be imposed upon land in Bengal, in reliance on an authority which admits of a very different interpretation from what has been put upon it by the present Government of Bengal!

APPENDIX.

THE BENGAL SANITARY DRAINAGE BILL.

ABSTRACT OF THE PROCEEDINGS OF THE COUNCIL OF THE LIEUTENANT-GOVERNOR OF BENGAL HELD ON SATURDAY THE 3RD AUGUST, 1895.

THE Hon'ble Maharaja Sir Luchmessur Singh Bahadur of Darbhanga said :—"I beg leave to move that this Bill be referred back to the Select Committee, or at all events that the final consideration and passing of the Bill be postponed for three months. The hon'ble member in charge of the Bill has admitted that the Bill itself is not a perfect Bill. Well, nothing in this world is perfect, but I think if some little time were given to local bodies to submit their opinions upon the revised Bill, we shall be getting a little nearer perfection than we are at present. The Bill has been so altered by the Select Committee that I think no harm can possibly be done by our delaying the passing of the Bill for a period of three months. No scheme of drainage can be taken in hand during the rainy season, and if any schemes of drainage or for the clearing out of silted rivers are in contemplation, they cannot be taken in hand before the cold weather; so that practically there will be no harm done to any scheme whatever by postponing the discussion upon this Bill for three months."

The Hon'ble Mr. Risley said:—"With your Honour's permission, I will take this opportunity of examining certain allegations which have been made regarding the supposed moral obligations of the Government in respect of the financial portions of this Bill. These allegations have been made and answered before. I wish I could think that they would not be made and answered again. Still, as memories are short, shorter perhaps here than elsewhere, and circumstances change, more repidly perhaps here than elsewhere, it may be well that I should answer them again, framing my answer to fit the present state both of the facts and of the law. I take them in the form in which they were put forward by the Hon'ble Surendranath Banerjee at the last meeting of Council but one. He said: "The proceeds of the road-cess have been charged with works which formerly had been carried out either from Imperial or from Provincial Funds." As a statement of fact that is beyond criticism, it describes precisely what has happened. I may add that it describes what ought to happen, and what must happen if the natural development of the country is not to be artificially retarded. The imputation underlying the statement that Government has by some juggle unfairly shifted a financial burden, is absolutely without foundation. Let me go back 15 years, to 1880, when what is now the Cess Act was under discussion in Council. The Hon'ble Kristo Das Pal then moved that a proviso should be added to the Bill to the effect that no work then charged to Provincial Funds should be made a charge on the District Road Fund. In opposing that motion, which was negatived without a division, the Hon'ble Mr. Mackenzie said several things which deserve to be remembered. He pointed out that the motion would restrict the administrative discertion of the Lieutenant-Governor, who was 'not as yet reduced to the position of a much-badgered Chairman' of a Corporation, and that it was inconsistent with the fact that although for various reasons the management of certain sources of revenue is transferred to local bodies, the ultimate responsibility for local taxation rests with the Government, and in the last resort it must determine whether any particular charge is equitable. I commend what was said on these questions of principle to all those who hold with the hon'ble member. For my present purpose it is sufficient to dwell on another point. In the speech I am quoting, Mr. Mackenzie said it was impossible to draw a hard-and-fast line of distinction between district roads and provincial roads. He went on to enumerate the chief roads then recognised as provincial. They were the following:—

1. The Grand Trunk Road to the North-Western Provinces and its branches.
2. The Orissa Trunk Road and its feeders.
3. The Chota-Nagpur system.
4. The Calcutta and Jessore Road.
5. The Calcutta and Diamond Harbour Road.
6. The Ganges and Darjeeling Road.
7. The South-Eastern Trunk Road, Dacca to Chittagong.
8. Certain Calcutta roads.
9. Certain frontier roads.

He added: 'There is, so far as I know, no present intention of reducing their number or of transferring them to but there is hardly any of the first eight of the series that might not, as regards some part or other of it, form a perfectly fair charge on local funds.' That was 15 years ago, but things have moved so fast, that by the present time the whole or large portions of several of these roads have already been transferred to local bodies, their place having been taken by railways, and as soon as other projected railways are open the remaining roads will go the same way. In each case of transfer, however, a sufficient grant has been made to the District Boards or Road Committees to enable them to maintain the roads to the extent required for local purposes. Now suppose Kristo Das Pal's motion had been carried, what would have been the result ? The Government would have been unable to transfer the control of these roads, nor could it have made any grants for their maintenance. For through communication they would have ceased to be of any use ; for local purposes they would still have been of great value. The Government would have been in the hopeless dilemma that it must either keep up great lengths of road running parallel to railways, and not wanted as main lines of communication, or else it must allow those roads to fall to pieces. That it should have maintained them or rather bits of them, as *local* roads is obviously out of the question. It would be absurd and intolerable that Government should keep up an establishment, along side of the district road establishment,to look after a number of scattered sections of local roads,because its hands were tied by a ridiculous proposal. In a word, the princilpe 'once a provincial road always a provincial road' which Kristo Das Pal endeavoured to introduce, and which the hon'ble member has recently attempted to revive, would have produced great administrative inconvinience and great waste of public money. It would have been an obstacle to the advance of Local Self-Government, and what is worse, immeasurably worse, it might even have hindered the development of railways. There is literally nothing to be said for it from any point of view.

" In connexion with this question of the road cess, a second allegation has been made. It is said that in a certain despatch the Duke of Argyll laid down the principle that ' the road cess, which was levied on villages, should be primarily devoted to the sanitary improvement of those villages.' The Hon'ble Member describes this despatch as a memorable document. So it is, though perhaps, hardly for the reason assigned by the Hon'ble Member. I will read the entire passage.

22. " * * * . * I have already pointed out that the purposes to which a tax may be applied cannot be considered as affecting the abstract right of the Government to exact it. But assuming this right, everything as regards the policy and even the justice of the rates now in question, turns upon the manner in which they are to be expended. It is, of course, essential that the Government of India should be itself satisfied that it is breaking no faith in any measure it may take ; but next to the necessity of this assurance is the necessity, or at least the great importance, of making the same conclusion plain to [the apprehensions of the people. For this purpose it is, above all things, requisite that the benefits to be derived from the rates should be brought home to their doors,—that these benefits should be palpable, direct, immediate.

23. The making and improving of wells, tanks and other works of irrigation affecting comparatively small areas of land, are the operations which probably best comply with these conditions. But roads are a first requisite in

the improvement of every country, and although as yet they may not be equally valued by the people, it is the duty of the Government to think for them in this matter and the benefits they must derive will yearly become more apparent to themselves" * * * * * *

"I must say, taking that passage as a whole, I cannot think its purport has been correctly understood by the Hon'ble Member. The writer of the despatch is clearly trying to put himself in the position of the Indian agriculturist as he conceives him. He says therefore in effect—petty irrigation works are best calculated to make the raiyat see that he gets something for his money. 'But,' he goes on, 'roads are a first requisite.' In fact, what the Duke of Argyll says is that the road cess should be primarily devoted to roads, though it might be politic to spend something on irrigation. About sanitary improvement there is not a word, nor would one expect to find much in a depatch of that date.

"I have shown, Sir, that the Duke of Argyll did not in fact say what the hon'ble member says he did. But even if he had said that, I do not see that it would have made any difference. A famous legal member commented once on the state of chaos that had arisen in a certain non-regulation province from the practice of legislating by executive order. An even worse chaos would set in if specific provisions of laws in force at the present day were liable to be modified by casual suggestions thrown out in despatches a quarter of a century old.

"The above remarks dispose of the allegation that the receipts on account of road cess are diverted from their legitimate objects. These receipts have now in most districts become merged in the District Fund under the provisions of the Local Self-Government Act, and no separate account is kept. The following statement, however, shows that the cost of such large drainage schemes as are specially contemplated by this Bill, could not be met from road cess collections. The figures are for 1893-94 :—

	Rs.	Rs.
Net collections of road cess		37,36,000
Expenditure, district roads ...	37,02,000	
„ on improvements, including water-supply.	24,7,000	
Total		39,49,000
Deficit		2,13,000

"So far, then, as road cess is concerned, the reply to the Hon'ble Member's statement is, first, that there has been no unfair transfer of Provincial roads to the control of local bodies ; that such transfer is the natural, reasonable and inevitable consequence of the development of railways ; and that when such transfers have been made, grants of the necessary funds have also been given ; secondly, that the Duke of Argyll did not lay down the principle that village sanitation was a first charge on the road cess ; and thirdly, that the cost of any far-reaching and expensive drainage schemes which may be stated under this Bill cannot be met from the proceeds of the cess because the local authorities who administer the cess cannot spare the money.

"I now turn to a second allegation. It is said that when the Public Works Cess Bill was introduced into this

Council, the Hon'ble Mr. Reynolds stated that the proceeds of the cess were to be devoted to meeting famine charges and certain other extraordinary public works charges which he specified. It is alleged that after meeting those charges there is an annual surplus balance of nearly eleven lakhs, which is now spent on ordinary public works, but which might be applied to meet the cost of drainage schemes under this Bill. Now, this allegation assumes three things—

(1) that there is a separate account or fund of the public works cess;
(2) that this fund has a surplus;
(3) that it is open to the Government to apply this fund to the execution of drainage schemes.

" None of these assumptions are correct. There is no such fund; if there were, it would not show a surplus; if it did, that surplus could not legally or equitably be spent on drainage schemes. Here again, I fear, I must go back to matters of history—of rather ancient history. In the first place, Mr. Reynolds's speech of 31st March 1877, made when asking leave to introduce the Bill, is not the most authoritative, nor is it the most distinct exposition of the scope of the measure. Sir Ashley Eden described the Bill more fully and more precisely in his speech of the 7th April, when he spoke of it as 'a measure for raising a further sum of money for the general development of works for the benefit of the whole of the Provinces.' The Bill was to do two things. It was to assist the famine finance of the Government of India by relieving that Government of the charges for interest on certain specified works. It was also to extend the policy of financial decentralisation and to enable the Provincial Government to accept the responsibility for the maintenance of public works, existing and future, in the same way as it is responsible for other branches of the administration. Mr. Reynolds went very ful'y into the first object; he touched on the second very lightly. Sir Ashley Eden, in the speech which I have quoted, brought out both points at length, and the preamble and subsequent sections give legal expressions to what he said. The preamble runs thus: 'Whereas it is expedient to empower the Lieutenant-Governor of Bengal to levy a cess on immoveable property and to apply the proceeds of the same to the construction, maintenance and charges of Provincial Public Works.' The question arose again in 1880, when the Hon'ble Kristo Das Pal moved an amendment to section 10 of what is now the Cess Act, which would have restricted expenditure on Provincial public works to works 'likely to protect the country against the occurrence of famine,' and would further have required the publication of an account. This amendment raised precisely the same issue that the hon'ble member has raised now. Kristo Das Pal said that the proceeds of the cess were 35 lakhs and the interest charges 27 lakhs, and he wanted to known what had become of the balance of eight lakhs, just as the hon'ble member now wants to know what has become of the balance of nearly 11 lakhs. On the figures then put forward, Mr. Mackenzie replied that for the year 1879-80, the net receipts from the cess were estimated at 34½ lakhs, while the payments on account of interest came to 37 lakhs. For the next year, the estimate of receipts was Rs. 32,71,000, and the interest charges Rs. 36,56,000. The balance, therefore, did not exist. On the figures now put forward, though the circumstances have in some respects changed, I have to give substantially the same reply. Taking for convenience sake the figures of the accounts of 1893-94, the results they show are the following—

		Rs.
Net collections, Public Works Cess		40,54,000
Net receipts, major canals		2,17,000
Total receipts		42,71,000
Interest on capital outlay, major canals		24,60,000
Maintenance, minor canals		5,63,000
Expenditure on Provincial roads.	By Public Works Department Rs. 10,18,000 By District Boards Rs. 3,35,000	13,53,000
		43,76,000

"I say the circumstances have changed. They have changed in that the railways now pay their way and the provincial revenues have no longer to pay the interest on the cost of constructing them. But while the charges for interest on railway capital have disappeared, the expenditure on Provincial roads has increased. This is a legitimate charge on the cess just as much as railways. Both are Provincial public works; both form part of that machinery for distributing the food-supply of the country which constitutes the real protection against famine. A railway without roads is useless. It is like an omnibus without a conductor. The one involves the other : railways imply roads. For a long time past the authorities of the various railways have pressed this matter on the attention of Government, and it has recently been taken up systematically on the lines laid down in the Public Works Resolution on feeder roads to the

Eastern Bengal Railway system, which was published in the *Calcutta Gazette* about the middle of June last.

"It follows from the fact that one main purpose of the Public Works Cess was to bring about an extension of the principle of Provincial decentralisation, and to enable Bengal, as Sir Ashley Eden put it, 'to use a little of its own milk,' which it had been contributing for the benefit of other provinces, that the idea of a separate account ceases to be practicable. The provision to this effect got into the Act of 1877 by a mistake and failure to realise the conditions of the case. It was never acted on, and it was abandoned in the Cess Act of 1880. As Sir Ashley Eden said in speaking on that Act, the fact that the money spent on public works largely exceeded the receipts from the cess was of itself a sufficient account. The receipts for Public Works Cess, like any other receipts, are merged in the Provincial revenues, and go to make up the resources which the Government has to administer. Towards the end of the financial year, when the budget is being prepared, the Government is beset with demands for money. It is by that time in a position to make an estimate of its ways and means, and it has to decide between many conflicting claims. To restrict its action by cutting up its receipts into so many separate sums and laying down that each sum shall be applied only to certain purposes would create infinite confusion, and would render administration impossible. Instead of one balance there would be a dozen, and no one would be able to say at any particular moment how the Government stood or what they were in a position to spend. The true test is to see how the available resources are administered; whether reasonable demands are met; and how conflicting claims are dealt with. For the present, all the public have to look to is that the Government spends on Provincial public works as much as it gets from the cess, and that is clear enough without a special account.

"I have shown, Sir, that there is no separate account of the Public Works Cess; and that if there were such an account it would not show a surplus. But even if this were not so, even if the receipts from the cess were greater than the expenditure incurred on objects properly chargeable to it, it would still be out of the question that drainage schemes under this Bill should be paid for from the Public Works Cess. Such drainage schemes must necessarily be local works in the strictest sense of the word. They will affect only part of a district, perhaps parts of two or three districts, but it is inconceivable that they should be extensive enough to be properly chargeable against receipts which are set apart by statute for the execution of Provincial works. The Bill as it stands, goes as far as it is possible to go in the way of lightening the temporary burden which a drainage scheme may impose upon the people of the locality affected. It provides that Provincial funds and District funds may contribute to the cost of such schemes, but the main payment must be made by the people who are benefited by the scheme. This I submit is in accordance with the natural equity of the case.

" I turn to the representation of the British Indian Association submitted the other day. I am compelled to say that this letter is not up to the traditions of the Association. Considered as a piece of criticism it is a very poor bit of work, a thing of shreds and patches, and what is more you can tell if you choose to take the trouble where the patches come from. In the first paragragh the Committee assume a pathetic attitude. They grieve to find that far from modifying the Bill so as to remove objections, the alterations have made it worse. That sounds dreadful, but is only a stock sort of phrase, which bears no relation whatever to the facts. One most important change has been made. The power of taking the initiative, of bringing this terrible engine to bear, has been transferred from the Government to a representative body—the District Board. Government cannot move a step of its own motion. And even when a scheme has been accepted by the Board, the power of modifying the scheme, which the Bill as amended by the Committee gave to Government, is restricted by the proviso, that if Government modifies a scheme, so as to add to its cost, the District Board shall have a chance of rejecting it.

"Now take paragraph 2. Can anything be more crude than the fashion in which the Association lump together a number of Acts with no attempt at serious argument? I have dealt with the Cess Act and the Local Self-Government Act already. The others may be disposed of in a word. As to the Drainage Act VI of 1880, I reply in the words of my hon'ble friend Babu Surendra Nath Banerjee that, 'the proposed legislation has nothing to do with agriculture. The Drainage Act is for the improvement of the soil. What is now proposed is for the benefit of health.' I cannot put the matter more tersely than that. As for the Embankment Act II of 1882, it is true indeed that section 7 (4) enables the Collector, subject to executive control, to make any sluice or water-course, or to alter any public water-course for the improvement of the public health, and section 54 enables him to recover the entire cost from the Zamindars of the estates, leaving them to recover from their subordinate tenure-holders the proportionate sums allotted on them. Can this possibly be the procedure the Association wish to recommend? If so, their taste is remarkable. I wonder what they would say if they were taken at their word. They might chance to find the Collector's little finger thicker than the loins of the District Board. Paragraph 3 may pass for the present. I shall have something to say about it later on. Paragraph 4 is curiously inaccurate, and I must say I cannot understand how any one can make positive statements of this sort without the smallest attempt to verify them. I consider that both the mover of the Bill and I myself have something like a grievance on this subject. At the Belvedere Conference both of us advocated and voted for a system which would have left the decision with the residents of the locality affected, but the majority of the Conference, headed by Babu Surendranath Banerjee, held that the District Board was a thoroughly representative body, and that it ought to decide whether any particular scheme should be carried out. It was also pressed upon by the Hon'ble Surendranath Banerjee that compulsion was necessary, and that the people must be saved from themselves. For a reply to the allegation that the people do not want drainage, I refer again to the same high authority whose name, I am confident will go down to a grateful posterity as the true author of this Bill. At the Conference he produced a map of opinions on the subject specially collected by him, and all of them, with hardly an exception, were loud in favour of drainage. I will not read the passages. Any one can verify my statement for himself.

"Now for paragraph 5. I do not wish to appear too critical, but I cannot help doubting whether snipping bits out of newspapers is quite the best way of composing an official letter though it may be the easiest. That is the history of the curious statement that, according to the last census, barely half the population were connected with agriculture. In point of fact, the occupation tables of the census show about 78 per cent. of the rural population to be engaged in agriculture. But this really understates the case, for the simple reason that people whose caste occupation in non-agricultural, but who also cultivate, get recorded as non-agriculturists. The settlement reports will show how the matter really stands. In Muzaffarpur it will, I think, be found that the entire rural population is more or less interested in land; and a few detailed cases such as which I quoted the other day from Munshi Nundji's report on the Mullarpur settlement in Birbhum are quite convincing. To the latter portion of the paragraph there is a double reply: first that where you proceed on the principle of local option, the argument of infringement of vested rights simply does not apply; secondly, that if this were not so, the question of the right of the Government to impose a rate was settled once for all in 1870 by the very despatch of the Duke of Argyll which my hon'ble friend described as a memorable document. In fact, the claim of the Zamindars amount to this. Because they get off with an absurdly light assessment under one class of taxation, they make the preposterous claim to exemption from all taxation; and in this particular case they demand exemption from a temporary tax which only comes into existence by the will of the representatives of the persons who will pay it.

"In conclusion I will add a few words about the relation of malaria to drainage. Malaria occurs all over the world —not merely in India; its very name, malaria, bad air, is an Italian colloquial word introduced into English medical literature by Dr. McCulloch in 1827, expressing the popular belief that the bad air and noxious exhalations of marshy places cause a certain fever, the symptoms of which are everywhere the same in temperate or tropical countries. As to the cause, many authorities are of opinion that it is due to a special organism, an amœba discovered by a French doctor working in Algeria. There is a large body of opinion in favour of a specific cause as distinguished from mere alternations of heat and cold; and a water-logged soil is peculiarly favourable to the production of this cause.

"All this theory, however, is really beside the point. If we were to wait till doctors had found out causes before we took steps to avert consequences, we should wait a very long time. There is ample evidence to show that the unknown cause of malarial fever—whatever it may be—is as a rule associated with stagnant water, with the obstruction of natural drainage. Not with water as such or with marshes as such, but with water which is dead. Where the water is moving and alive—though it may move too slowly for you to see it move—there you have no malaria. Raja Digambar Mitter pointed out this long ago, and Eastern Bengal is a standing illustration of it. There is a famous case of the same kind in Europe, the country known as the Spreewald, or jungle of the river Spree, round about Berlin and Potsdam. A queer 'amphibious country' as Carlyle called it. The villages there are all situated on lakes or bils in the middle of jungle. It is all water, creek and khals everywhere ; people go to church and children to school in boats. But though you can see no stream, the water is alive, not dead. There is no malaria, there never has been, and the physique of the people is splendid.

" Further west in districts which form part of the same great plain, where the physical conditions are the same, but there is really less jungle and fewer marshes—in the west of Schleswig—Holstein, in Oldenburg, Westphalia, and the north of Hanover—the drainage has been obstructed by the silting up of khals, and there malarial fever is endemic. The khals have silted up by the reason of the dykes made to keep out the sea. They have a most elaborate system of embankments, just as we have in Midnapore and elsewhere, and it is admitted that the dykes have blocked the drainage. Much the same state of things prevails in parts of the Rhone valley, in the Charente south of the Loire, on the coast of Holland, and in many parts of Italy. In the lower basin of the Danube and the valley of its tributary, the Theiss, malaria is so bad that about half the population suffers from it regularly, and the Dobrutschka, the actual delta of the Danube, is almost uninhabitable from fever.

" Everywhere the cause is the same—obstruction of drainage ; everywhere the fever is exactly what we know here, and, I may add, wherever drainage works have been carried out so as to restore circulation and set the water moving, there the fever has disappeared. You do not want to drain the place dry ; all you want to do is to remove the condition of stagnation. This is what has been done in the fen districts of the eastern counties of England, where until quite recently malarial fever was endemic—it was always there. This was a district very much like the Berlin country which I have mentioned only with this important difference—that the water was stagnant. Every one suffered from malarial fever, just as people do in Bengal, and curiously enough they used the same remedy—they took opium. Within recent memory the district has been drained; the fever has absolutely disappeared; the fens are now as healthy as the Berlin country, which is one of the healthiest in Europe. The water is still there, but it moves and does not stagnate; it is alive instead of being dead; and the district nstead of being avoided as deadly is now a favourite pleasure resort in summer. People come from all parts of England to sail and fish on the Broads, as the great bils are called, which used to be perfectly fatal in the summer, at the very time when they are now full of tourists. The same sort of thing has been done in Romney marsh in Kent, in the Somersetshire marshes, in France, in Holland and in Italy; and wherever it has been done the fever has vanished or has been greatly reduced. That is the experience of Europe in respect of malaria fever, which, I repeat, is the same all over the world. I have referred to this foreign experience at length for two reasons: (*i*) because drainage has been tried and its results can be seen; (*ii*) because the Phenomena in Europe enable you, so to speak, to isolate the cause and bring out the connection of malarial fever with obstructed drainage. The climate there does not of itself tend to produce fever. It takes a special cause to do that, and you can see what the cause is. In this country the question is more complicated, and arrested drainage is only one of the causes. It is this complication, this presence of many possible causes which has obscured the subject in this country. Some people have laid stress on one of these and some on others.

" The great advocate of the drainage theory was Raja Digambar Mitter, attempting to show that the railways and the roads were the sole causes of obstruction. Others brought into prominence the impurity of village sites; others the use of bad water; others again poverty and bad food. Now this last is certainly not a cause *per se*, though it may contribute to disease by weakening people. Also when drainage has been spoken of there has been much confusion of thought. Some people thought subsoil drainage was meant, such as you have in fields in England, so as to dry up the rice fields. Others referred to municipal drainage; others to drainage schemes intended to convert large bils into dry land. But if you understand by drainage, what is really meant in this connection—the restoration of the natural drainage channels so that the water shall flow and shall not stagnate—there is really no substantial conflict of opinion.

" In the discussion in the Press last year in connection with Sir Charles Elliott's Dacca speech, several well-known names were quoted against the opinion that malaria is due mainly to obstructed drainage. Dr. Lethbridge was quoted as attributing malaria to poverty, whereas what he really said was that obstructed drainage was the case. Dr. Greene, quoted on the same side, was really strongly in favour of the drainage theory. Colonel Haig and Dr. Saunders held that poverty was a factor in so far as it rendered people less able to resist fever. But neither of them regarded it as a primary cause. It must be added that since 1873 when these gentlemen wrote, the mills have developed enormously in the neighbourhood of Calcutta, and the lower classes there are much better off. As for Dr. Lyons, whom somebody quotes, none of us can trace his writings. He has retired. However this may be

—whatever may be the truth on the scientific side of the scientific point, there can be no question as to this—that, up to quite the other day, everyone in Bengal was a disciple of Digambar Mitter. Every one believed that drainage was the remedy, and that Digambar was the prophet of drainage. Within the last year they have all been suddenly converted: apparently they see that they will have to pay for what they expected to get for nothing. It does not lie in their mouth to use the arguments which they have used."

The Hon'ble Babu Guru Proshad Sen said :—" * * * * It is not for me now to dwell on the advantages that have accrued from the Permanent Settlement, but I have a firm conviction, in which I find the majority of my countrymen share, that that settlement has benefited the people and the State alike, by the increased prosperity which it has brought about in its train and the expansion which it has given to our other sources of revenue. Bengal counterblances what it pays less in land revenue by paying more in custom duties and assessed taxes, even if we were not to place to its credit the increased revenue which it yields from other sources. Anything, therefore, that tends to impair in any way that settlement, my countrymen humbly pray Your Honour's government to avoid. It does not, however, appear why landlords and cultivating raiyats alone should be taxed, while all classes of the community would benefit by the work. That this as an abstract proposition is not equitable, is admitted on all hands. But it is said that this equitable idea could not be given effect to, because there is no machinery existent to equalize the tax in proportion to the benefit conferred. It passes the comprehension of the public how a mighty Government like ours and this Hon'ble Council, which represents the supreme wisdom and intelligence of the land would feel itself powerless to give effect to its idea of equity, and would have to adopt with thankfulness the solution suggested by an outsider which, however, is no solution at all. I may say that the idea of apportionment according to the amount of benefit conferred is adopted in the Embankment Act II of 1882. I would be the last man to say that a tax which would reach all classes alike, would be a preferable substitude. Taxation in the country has, under the present condition of things, reached its utmost limit."

The Honble Mr. A. M. Bose said :— " * * * * * I confess there is considerable difficulty in understanding the genesis of this measure. As far as I have een able to follow the proceedings of the Belvedere Conerence, three of the resolutions passed at that Conference apply to matters municipal, and one of them only to the question of rural drainage which came up almost incidentally, and had not been even so much as referred to in the Hon'ble Mr. Risley's note which led to the holding of the Conference, nor was anything said there to show the inadequacy of the present state of things. On the other hand, I attach very great weight to the expression of opinion by a gentleman whose opinion is entitled to the utmost consideration, namely, the then Chief Engineer and Secretary to Government in the Public Works Department, Mr. McNeile, which will be found at page 6 of the Appendix to the proceedings of the Belvedere Conference. I shall first draw the attention of the Council to one matter to make the reference clear. At the present time and under the existing law, there are provisions for sanitary drainage. I need not refer to the provisions of the Bengal Drainage Act, because it may be said that these are intended for the drainage and improvement of land, though, in passing, I may point out that the drainage of marshy areas will have great effect upon sanitation as well. There is in fact an intimate connection between measures calculated to drain land or to open out water communications, and measure of drainage calculated directly to effect sanitation. But without referring to that Act, I may point out that, under section 109 of the Road Cess Act, there is distinct power to spend a portion of the district fund for the purpose of improving drainage; and further in section 79 of the Local Self-Government Act, the same thing is repeated. It is there enacted that 'it shall be lawful for a District Board to take measure for, or to contribute towards * * the construction and maintenance of any means and appliances for providing or improving drainage.' Then there are in the same Act certain provisions under head (E), having special reference to sanitation under which money may be expended, and which make it the *duty* of District Boards, so far as may be possible, to provide for the proper sanitation of their districts. Therefore there can be no question whatever that there are provisions in the existing law by means of which agricultural drainage as well as sanitary drainage may be carried out. And having regard to this, I place before the Council this expression of opinion from Mr. McNeile to which I have referred. He said with reference to proposed legislation:—

> 'My own idea is that it will be possible to do a great deal more under the present Drainage Act.' And he goes on to say—'If I am right in thinking we can do what is required under the existing Drainage Act, then it is worth consideration whether it would not be better to pass a special Act now for the particular water-supply scheme which has started this proposal to legislate, and not a general one.'

" It is, Sir, a common-place of legislation, one of its recognise axioms, that it must be shown that all that could be done under the powers already given by the Legislature has been done before fresh powers are given or asked for. As I have said, that has not been done. The burden of proof lies, and lies heavily, upon the promoters of this Bill to show the necessity for fresh legislation, and not only has that burden not been discharged, but not even an *attempt* has been made to discharge it. This appears to me to be a singular and a fatal omission so far as this measure, at any rate its taxation clauses, are concerned. I have already referred to Mr. McNeile's opinion. I must respectfully express my surprise that the instances mentioned by the Hon'ble Mr. R. C. Dutt of drainage schemes which have been sucessfully carried out by District Boards liberally helped by the Government were cited by him as arguments in favour of this Bill. It appears to me that instead of being arguments in favour of the Bill, they are reasons which go against the necessity for any such Bill. These and other instances which have been quoted, and many others which may be quoted, of improvements in sanitation by means of drainage, show that the District Boards, aided where there is need by Government, are in a position to carry out such schemes. Therefore, until facts and figures are adduced which conclusively prove the necessity for this Bill, I submit with the utmost confidence that there is not that foundation laid which is requisite in all cases of fresh legislation. The general and indefinite proposition that more schemes of drainage can be carried out if there were more funds is not, I need hardly point out, by itself a justification for additional taxation."

The Hon'ble the President said :—"The debate to which we have listened has been of a very discussive character, and as I had occasion more than once to remark, has included subjects which one could hardly have expected to be touched upon in the closing debate on the passing of the Bill; but there was a special reason in the case of one and possibly of two hon'ble members, because of the newness of those members. I cannot but congratulate the Council in having had the advantage of hearing their views, and it cannot be said that every opportunity has not been given to those who were dissatisfied with the Bill to represent their opinions and bring forward their arguments with the utmost possible freedom and with abundant time given to them for preparation.

"The debate to-day has turned chiefly on the financial clauses of the Bill, and I think there is still considerable misapprehension on the subject in spite of the extent to which it has already discussed. Our old friend the Permanent Settlement has been trotted out again. I cannot conceive how any reasonable person can suppose that the imposition of the cess under this Act has the slightest connection with any invasion of the Permanent Settlement. If there is a proposal to drain any obstructed channel, and if the Zamindars and owners and occupiers of land which lie within the obstructed tract strongly object to any steps being taken to relieve the obstruction, I think they would have sufficient influence with the District Board to prevent any scheme being carried through. It has been said, and I was sorry to hear it, especially from the hon'ble member who has been nominated on the election of the District Boards of Dacca, that the District Board is not a representative body, and they have been belittled by one who has been sent here to represent them. I do not agree with what that hon'ble member has said, and I do not think he correctly represents the independence and freedom of the District Boards with respect to matters which come before them, whether they are supported by the Government nominees or not. We have the opposite view stated by the Hon'ble Babu Surendranath Banerjee that he was convinced that no District Board would propose any scheme which would involve the imposition of a cess. However that may be, I think it may be accepted that a District Board would not sanction the imposition of a cess against the resolute and strong opposition of the persons who would be called upon to pay that cess. If then a scheme has been carried through the District Board it must have been with the consent of the landowners, and when the works have been carried out, who would have to pay for them? As the hon'ble member in charge of the Bill has said, if the District Board can pay for them out of money in its hands, or if the Government can make up a sum which added to the amount which the District Board can give, would pay for the work, then there will be no occasion for the imposition of a cess. The Hon'ble Babu Guru Proshad Sen is in my opinion under a misapprehension in supposing that whereas drainage schemes are now being or can be carried out under the provisions of the Local Self-Government Act, because under this Act District Boards will be able to impose a cess, therefore they will determine to bring the proposed work under the provisions of this Act and not under the Local Self Government Act. I rather think the correct argument is that they will not impose a cess unless they find it absolutely necessary. Suppose it is necessary to impose a cess for a scheme of drainage, who should pay for it except those who benefit by it? These are principally the Zamindars and holders and occupiers of the land, and can it be said that because there is a Permanent Settlement of the Land Revenue the Zamindars should derive the benefit from such work and somebody else should pay for it? It was an impossible position to take up that the Permanent Settlement entitled them to have their lands drained and the obstructions they have made, or allowed to be made, cleared out of these drainage channels at the cost of others. The idea that the landed interest, who amounted to about 90 per cent. of the rural population should enjoy the benefits which would result from improved drainage, and somebody else should provide the money was so absurd that it could not be entertained. It had been given up long ago in the two classes of cases of this kind which already exist. We have had frequent references to two Acts which are in existence, the Embankment Act and the Agricultural Drainage Act, which it is argued should take the place of this Act. The hon'ble member, the Secretary in the Financial Department has dealt with the suggestion as it affects the Embankment Act, and he might also have referred to the Agricultural Drainage Act under which the cost is equally borne by the landed interest. The hon'ble members who referred to these Acts forgot to notice that in both these Acts the whole of the cost is thrown on the landlord, and he does not get the power of passing on the half of it to the raiyats. Under the Embankment Act he can pass it on to the tenure-holder, but not to the raiyat; under the Agricultural Drainage Act, he cannot pass it on to either, and can only recover from the raiyats by raising their rents; so that the two Acts which the Government are asked to consider lay on the shoulders of the landlord, a burden far greater than the burden we propose to impose upon him by this Bill. The little finger of these gentlemen will be heavier on the Zamindars than the whole weight of the Government Bill.

"I have thus dealt with the proposition that land-owners should not be taxed at all. I will now pass on to the second objection that land-owners and agriculturists should no be the only classes to be taxed, as they will not be the only classes that will be benefited—that the taxation proposed by the Government will be of the nature of class taxation. Here again, we have perhaps been a little too modest, and have allowed ourselves to be trampled upon unnecessarily. It is necessary to point out that the class upon which we are imposing a cess is practically the whole population, and that the class who will escape it are a very infinitesimal portion, hardly more than .5 per cent. We say that it is impossible to devise means by which to impose a cess upon those who are not agriculturists, in order that they may pay their share of the cost without going through an amount of labour, creating an amount of machinery for assessment, for giving notice for hearing objections, for hearing appeals, and for collecting the cess, and incurring an amount of expenditure which no statesman would think of incurring.

"We have an instance before us to-day of the amount of error which exists on this subject. The British Indian Association have had the rashness to assert that the Census returns show that the agriculturists upon whom this rate would fall form barely half of the population. The gentleman who wrote that letter could not have consulted the Census returns, but must have been content to take his figures from some other source. I think I have recently seen that statement in a newspaper article, and it may have been taken from that source without taking the trouble of verifying the reference. My hon'ble friend, the Secretary in the Financial Department, has exposed the the incorrectness of such an assertion, and he gave the exact figures of the Census returns which put the agriculturists proper and the rural labourers taken together at 78 per cent., and he also gave other references which justified the assertion generally accepted in all economic writings on Indian subjects, that the agricultural population cannot be taken at less than 90 per cent. of the whole The Hon'ble Babu Eshan Chunder Mitra evidently failed to hear what the Hon'ble Mr. Risley had said, and is still in the vale of ignorance, for he repeated the statement of the British Indian Association that the agricultural population is barely half of the whole population. This is an instance which shows how hard error dies, and how easily a misstatement, once set afloat, is taken up and repeated without criticism or examination. It is important to impress upon the Associations and other public bodies who address the Council, that if they want honestly and intelligently to assist us in our deliberations, they must learn to verify their facts and assertions and know what they are talking about If these matters were properly understood, the Council would not have so much of its time wasted.

"I turn next to some financial suggestions which belong to this part of the subject. We have heard to-day some instances of the extraordinary financial ignorance which used to prevail, but which has been largely dispelled by the knowledge gained in the discussions on the Budget. For instance, we are told that the District Boards have such large balances that they could meet any schemes for drainage out of those balances. The gentlemen who made these assertions did not know accurately what the amount of these balances was, but the true figure was 14 lakhs of rupees. They did not consider that District Boards must have working balances in hand, and that for 38 Boards the average balances was under Rs. 40,000, which would not go far towards a large drainage scheme. Nor were they aware that in too many cases the whole of the balance has been forestalled, the District Boards having incurred liabilities which, if presented at the end of March, would have swallowed up the whole of their balances. Another thing we have been told, is that the Government of Bengal should appeal to the Government of India for money to carry out schemes of drainage instead of imposing a rate. Where was the Government of India to find the money? People talked as if the Government went about with money in their pockets ready to give it away as people give charity to beggars. If the Local Government gave money for these drainage schemes when it had not a surplus, it would have to take it away from some other equally important source of expenditure. If the Government of India gave the money, they would have to rob some other Government. Why should the Government of the North-Western Provinces, for instance, be taxed to improve the sanitary drainage of Bengal? I think one beneficial result, which will accrue when members get into the habit of discussing public measures, is that in the course of time the Council will be saved from the repetition of arguments of this kind.

" The Hon'ble Babu Surendranath Banerjee has suggested that I should direct that sanitation should be the first charge upon the road cess. I must say I cannot agree with the hon'ble member, for this simple reason that the road cess is the road cess; it is not a sanitation cess. It is imposed for the purpose of making roads, repairing roads, and extending roads, and it would be an improper and dishonest diversion of those funds if we deliberately starved the roads for purposes of drainage. What we do hope is that the proceeds of the road cess will be sufficient for roads and leave a balance over. Some districts found it easy to make all necessary provisions for roads, and yet have a surplus. Backergunge, for instance, a district with more waterways than roads was able to give a sum of Rs. 10,000 to the District funds. My hon'ble friend, Mr. Romesh Chunder Dutt, has told us how much the District Board of Burdwan has been able to do towards these sanitary measures. In this respect the despatch of the Duke of Argyll, from which hon'ble members have largely quoted lays down instructions on this point in a very stringent form—

> 'Roads,' he said, 'are a first requisite in the improvement of every country, and although as yet they may not be equally valued by the people, it is the duty of the Government to think for them in this matter, and the benefits they must derive will become yearly more apparent to themselves.'

"I hope the hon'ble member will think for them. While I have the despatch in my hand, I should like to draw attention to a passage at the end of paragraph 24 which bears a good deal on the discussion which has taken place to-day. It is there said 'If there are some great improvements in their condition which we cannot afford to undertake, we must not be precluded from throwing the cost of such improvements upon those growing resources of which we heartily desire to see the people in enjoyment, but which are due in a great measure to the Government we provide.'

"We are exactly carrying out those principles.

"With regard to the connection between drainage and malaria, we had a very useful statement from my hon'ble friend, the Financial Secretary, and I am glad that he has drawn attention to the letter of Dr. Harvey. I regret to find, that a copy of it was not circulated to all hon'ble members, although it was laid before the Select Committee. It is a letter of the greatest importance and will go a great way to form public opinion on this subject, and I therefore propose to have it published in the Government Gazette.

"In addition to what was said by Dr. Harvey, and what had been stated by the Hon'ble Mr. Risley to-day, I would draw attention to an article which appeared in the *Pioneer* of this morning, which treats of malaria as a thing as to which experts have now hardly any doubt that it is due to a bacillus which is to be found in the blood. There are no doubt some who still suspend their judgment, or consider the evidence weak, but the general tendency of science in the present day is in the direction of believing that this disease (malarial fever) is due to a poisonous bacillus of this kind, and that by effective drainage you can take an important step in the direction of destroying it.

"Now with regard to the proposal of the Hon'ble the Maharaja of Darbhanga to postpone the passing of the Bill, I agree with the hon'ble member in charge of the Bill that no reason has been shown for taking such a course. Few Bills have received fuller and longer consideration than this, and the effect of postponing its passing will be, either that I must leave it to my successor which would not be fair to him, or that a special Session of Council must be held early in December at a time when otherwise it would not be necessary to summon you. The effect of such delay would be to produce the precise effect which the hon'ble member thought it would not produce viz., to prevent anything being done under the Act in the next cold weather, for if passed by the Council in December, it could hardly expect to receive the sanction of the Governor-General in Council before January or February, and by that time it would be too late for any practical work to be done in the cold season. This would be no argument against delay if it were shown that on general grounds delay is required for the fuller discussion of new arguments and objections, but no such cause as this really exists or is even alleged to exist. Nothing has been brought forward which is new, or which requires further consideration; we have all made up our minds, and the only result will be that we shall be bombarded with more papers from local bodies, such as those we have been lately receiving. From one point of view it is hardly courteous that communications addressed to this Council should not be noticed, but from another point of view many of them are of a description which makes it a waste of time to consider them. For instance, there is a communication from a Murshidabad Association, in which they say :—'We have learned with considerable consternation that it is intended to impose a tax,' and they say this after the Bill has been for a year and-a-half before the Council? Why, this question was specially discussed at the Provincial Conference which met at Murshidabad only the other day, and they (unlike the British Indian Association, who saw no merit in the alterations in the Bill) expressed their satisfaction at the amendments which had been introduced. There were there assembled delegates collected from the whole of Bengal, and yet the Mursidabad Association never heard a word about it. There can be no doubt that for people of this kind to take a share in discussing public measures introduced by the Government will afford them a much-needed education. Then there is the Rajshahi Association who take exception to the financial clauses of the Bill and ask attention to what they had previously written on the subject. Would it surprise the Council to hear that in the previous letter received from the Rajshahi Association nothing is said about the financial clauses of the Bill, except on the point that the cess should be so distributed as to include other than the agricultural classes. It is quite clear that these are mere puppets, and that the strings which make them act are drawn elsewhere. And it is the expectation of receiving such papers and such arguments as these, which is put forward to discourage the Council from passing a Bill, which has been under consideration for a year and-a-half, during which time every point had been minutely examined and amply discused. On the contrary it appears to me that they afford a reason why the Bill should be passed now, and thus save us from the receipt of further communications of the kind to I have which referred.

"In putting the motion of the Hon'ble the Maharaja of Darbhanga, I can only say that it is directly opposed to the wishes of the Government. I am anxious that the Bill should be passed to-day, and I trust the majority of the Council will vote on my side."

FROM

RAI RAJKUMAR SARVADHIKARI BAHADUR,
Secretary, British Indian Association.

TO

THE HON'BLE J. A. BOURDILLON, C. S.,
Secretary to the Government of Bengal.

SIR,—IN reply to your Circular letter No. H S, dated the 10th of April, 1895, I have the honour to submit by direction of the Managing Committee of the British Indian Association the following observations regarding the Sanitary Drainage Bill.

The science of sanitation being one of very recent growth considerable difference of opinion prevails as to the best means of removing malarial influences by sub-soil drainage. Whether extensive drainage works covering a large tract of country are more effective than a number of small works removing the surplus moisture in the close vicinity of human habitations is still a moot question. The preponderance of scientific opinion is in favour of the latter procedure. But whichever be the correct theory, the Committee of the British Indian Association are of opinion that there is at present ample provision in the Indian statute book for the drainage of land either for agricultural or sanitary purposes. The Cess Act, 1880, section 109, and the Bengal Embankment Act, 1885, section 79, give ample powers to the District Collector for the construction of new water-courses or drainage-channels and for the clearance and maintenance of old water-courses, independently of the wishes of land-holders and their raiyats, and, evidently in spite of their opposition. There is also the general Drainage law of 1880 based upon the experience gained by the operation of the special and local Act of 1870. It is no doubt true that few drainage works have been undertaken under the Cess Act and the Embankment Act. The cause is not far to seek. Neither the District Officers nor the District Boards have that intimate knowledge of the conditions and requirements of the people which could enable them to undertake such works. Even the works executed under Act VI of 1870 and Act VI of 1880 have proved anything but a success. The only District Officer, Mr. H. G. Cooke, C. S., who has had experience of the working of the Acts speaks of them in terms of severe condemnation. "Drainage works," says he, "under Act VI are not altogether satisfactory precedents for Government interfering as public benefactors, and, if alluded to, should be quoted rather as warnings than as examples ."

Government has year after year directed the attention of District Boards to the necessity of spending a part of their funds in sanitary works, but without avail. From the very nature of their constitutions they hardly feel any interest in the matter. In several districts landholders who have the largest stake in the district are not members of the Board, and the majority of memebers are either local pleaders or absentee landholders, who are quite ignorant of the condition and requirements of the cultivating classes in the district. So long as District Boards are not composed mostly of intelligent and educated landholders who manage their own estates they would hardly be able to devote to the consideration of the questions connected with sanitation and improvement of land that intimate knowledge of the condition and requirements of the people and of their ability or inability to bear the cost of a proposed work which is essential for their right determination.

The original scheme of Local Self-Government fully recognized the value of local knowledge and experience in matters of sanitation. Instead of vesting the District Boards or Sub-divisional Boards with authority to initiate and carry out sanitary works it entrusted such works to the care of Union Committees composed of a number of the villagers themselves. In a large majority of cases the sanitary improvement of villages might be effected not by extensive drainage schemes involving a a heavy expenditure, but by the construction of small water courses and other works, and it is the villagers themselves who are the best judges of the necessity of such works. The necessary powers under the law have been given by sections 115, 116, 118 and 119 of Local Self-Government Act, and it only remains for the Government to give full scope to these provisions of the law by organising and appointing Union Committees in different districts and Sub divisions.

It should be borne in mind that sanitary improvements consist not only in provisions for effective surface drainage, but also in the introduction of proper conservancy arrangements and in the purification of supplies of drinking water. Extensive drainage schemes involved payment of enormous costs which it is always difficult to apportion equitably and which must fall heavily on those who are already overburdened with taxes, while they ignore two other factors in sanitation, namely, conservancy arrangements and supply of pure drinking water, which are as much essential as surface drainage. The powers vested by law in Union Committees happly recognize the importance of all the elements which go to improve the sanitation of a village.

Having made these preliminary observations which are calculated to show that it is a measure fraught with the greatest hardship and injustice both to landlords and raiyats, the Committee of the British Indian Association, protesting strongly against any fresh legislation, feel bound to submit *seriatim* their remarks on the Bill as it stands and accordingly proceed to do so.

Para 3 of the Letter.—The least objectionable procedure for initiating a scheme appears to the Committee to be that prescribed by Act VI of 1880 B. C. Any attempt to get the opinions of the raiyats or of those who are unconnected with the land, but who would nevertheless be benefited by the work, would be wholly impracticable. The votes of landholders who own at least half the area of the land to be benefited will be a guarantee that the work would be beneficial both to landholders and raiyats. The only departure from the present procedure which the Committee would beg leave to recommend is that in publishing the Notifications mentioned in Section 14 it would be well if lithographed copies of the plans and estimates be tacked to the Notification in order to enable parties interested to see at once what the project is without taking the trouble to go to the Sub-divisional Office. The Committee would also submit that after a scheme is found to have been approved of by the votes of landholders, owing at least half the area of land to be benefited, it should be submitted to the consideration of the Commissioners appointed under Sec. 3, at least three-fourths of whom should be resident landholders. The scheme should also be published and public criticism invited upon it. The final acceptance or rejection of the scheme should rest with the Drainage Commissioners.

Para 4.—No single scheme should affect the land of more than one district. The physical characters of even two neighbouring districts may be, and generally are, different from one another, and a work which might involve a heavy expenditure in one district may be done much more economically in another. No attempt should lightly be made to interfere with the unit of administration as represented by a district.

Para 5.—Almost from the very beginning of a drainage work the Commissioners have not a light work to do. The consideration of the scheme itself, of its possible amendment the supervision of survey operations, the control of establishment, the classification of lands, the apportionment of cost and the consideration and disposal of objections made to classification and apportionment, entail a large sacrifice of time and labour. Few member of District Boards, and few persons not personally interested in the work could afford to make such a large sacrifice of time and labour. The work requires, besides, an amount of special knowledge regarding crops and tenures which those who are not landholders can hardly possess. The Committee, therefore think that whenever a drainage scheme has to be carried out Commissioners should be appointed for the purpose.

Para. 6.—It would be an act of grievous injustice to andholders and raiyats if the whole cost of a sanitary work be made recoverable from them and not also from others who would be benefited by it. But it would be wholly impracticable to get at those who are unconnected with the land and who would be as much benefited by a work as landholders and raiyats,' if not more. From the very nature of the case the burden of the cost would fall upon those who are already overburdened with taxes, while those who pay comparatively little to the public exchequer would go scot-free. This consideration should be a most powerful argument in favour of meeting the cost of the work from the general revenues of the country instead of making it a further tax on land. Looking at the provisions of the Local Self-Government Act the Committee confidently submit that landholders and raiyats have been already paying for sanitary works and that it would be an act of great injustice and hardship to them if they are called upon to pay again for such works. A part of the cost taken from Road Cess and Public Works Cess Fund would be to all intents and purposes payment by landholders and raiyats. It would be exceedingly unjust to impose upon them a double obligation for the same purpose. The extension of time by Sec. 39 within which payments may be made will help them little. Keeping accounts of instalments paid and to be paid would require the entertainment of an establisment which add to the burden, while a liability running over such a length of time as 30 years would materially prevent landholders and raiyats from making any further improvements in their land. The injustice of throwing the burden of cost upon landholders and raiyats and the impracticability of recovering any portion of the cost from those unconnected with land, who will share the common benefit, leave no other alternative but to make the cost a charge upon the Provincial revenues. The obligation of Railway Companies and District Boards to bear a part of the cost of drainage works rendered necessary partly, if not wholly, by their embankments and roads is clear. They should certainly be made liable for it.

Para 7.—It has been found by experience that the recovery of the cost of maintenance from a large number of persons, year after year, is a source of great harassment and loss to landholders and raiyats. It entails a very heavy cost for establishment and much useless expenditure of money in issuing certificates and resorting to other coercive processes. The cost of maintenance should always be capitalised and added to the original cost of the work and apportioned once for all.

Para 8.—After what has been submitted above no remarks are necessary regarding this para. All reference to District Boards should be omitted. The Drainage Commissioners should have an absolute voice in the matter.

Para 9.—Section 46 of the Bill should be omitted. It is not necessary to take large powers for preventing obstructions than those given by the Embankment Act. Claims for compensation should certainly be allowed and compensation given in all cases in which it would be proved that a party has suffered damage by reason of his not being allowed to cultivate a plot of land or catching fish in a stream which has been heretofore recognised as his private property.

I have the honour to be,

SIR,

Your most obedient servant,

RAJKUMAR SARVADHIKARI,

Secretary, British Indian Association.

BRITISH INDIAN ASSOCIATION ROOMS,
18, *British Indian Street.*
Calcutta, July 3, *1894.*

FROM

RAI RAJKUMAR SARVADHIKARI BAHADUR,
Secretary, British Indian Association,

TO

THE HON'BLE H. H. RISLEY, C. S.,
Secretary to the Government of Bengal.

SIR,

WITH reference to your Circular No. 13S, dated the 28th February, 1895, I have the honour to submit below the observations of the Managing Committee of the British Indian Association on the amended "Bill to facilitate the construction of drainage works &c."

The Committee of the Association regret to find that most of the objections which they ventured to take to the provisions of the Bill as originally introduced in Council still hold good. They crave a reference to their first letter on the proposed measure.

Section 2, Cl. 5.—The hardship experienced by joint holders of estates and tenures by reason of the whole amount of Road Cess and drainage charges being recovered from one holder instead of rateably from all the holders has been, on different occasions, so strongly and persistently represented to public authorities that Government has recently ordered that the demand should be rateably recovered wherever practicable. It would be well, therefore, if this clause were so modified as to provide that in all cases in which separate accounts have been opened for shares of estates in Collector's books and tenure-holders make separate collections from the raiyats of a joint tenure the holder of a share of an estate or tenure shall be liable only for his share of the charge.

Section 3.—For obvious reasons persons connected with the land should have a predominant voice in the Committee of Drainage Commissioners. The proportion of such persons should, the Committee submit, be two-thirds of the entire number. As the elected Chairman would in most cases be a public officer the Drainage Commissioners connected with the land would be in a standing minority unless the proportion be increased.

Section 4.—In the case of Municipal Commissioners the members to be elected as Drainage Commissioners will rest on the discretion of the Local Government, but this Section makes no provision as to the number of members of the District Board to be elected by each District Board in cases in which the local area is part of more than one District.

Section 6 *(e)*—While obstructions to drainage might be traced in almost every instance to Railway embankments, roads and Government embankments it would be extremely hard and unjust if holders of estates and tenures and cultivating raiyats be made solely liable for the payment of the cost of drainage works, the more specially as they had in at least a large number of cases no hand in contributing to the obstruction of the drainage and they will not gain by such works beyond those quite unconnected with the land.

Section 10.—The acceptance or rejection of a scheme by the Local Government will rest on the recommendation of the District Boards and not of the Drainage Commissioners. It is the District Boards also who will submit the scheme to the Local Government and who will ultimately carry it out and get the work of apportionment of the charge done by the Collector. Although Section 3 provides for the appointment of Drainage Commissioners " for carrying out the provision of this Act" the Committee fail to see what functions, they will perform and where is the necessity of appointing them at all. They would certainly have the privilege of submitting to the District Board " their advice as to the adoption or rejection of the scheme" but this they will enjoy, without such appointment, in common with the rest of the community under the provisions of Section 8. The Committee of the Association, therefore, venture to submit again that both the initiation, adoption or rejection and ultimate execution of drainage schemes should rest with the Drainage Commissioners. In all cases of urgency and in all cases of perversity on the part of Drainage Commissioners the ample powers conferred on District Officers by the Enbankment Act and on District Boards by the Cess Act should be enough to remove obstructions to drainage hurtful to the community.

Section 19.—If the apportionment of the cost be made on the basis of the apportionment of the Road Cess, as this section provides, it is not only the proprietor of the lowest grade, who is in immediate possession and whose raiyats would benefit by a sanitary work, who will have to pay, but proprietors of superior grade who would be quite unaffected by the work would also have to pay. The distribution of the cost in the manner proposed would therefore have all the character of a new imposition on land and increase of land revenue in opposition to the pledges given in 1793. In many instances the superior landlord who has let out his estates in permanent leases has no direct connection with the land and as such is debarred from reaping any benefit from improvements made in the land. Under this section, however, he shall have to pay a share of the expenditure out of the fixed jamma he receives which will necessarily reduce his income without giving any adequate benefit in return. This would be very hard upon the superior landlord.

Sections 28 and 29.—The recovery of the share of the cost from cultivating raiyats and others benefited by a sanitary work should be made direct by public officers. It has been a crying grievance of landholders that the obligation thurst upon them of collecting the cesses from their raiyats and rent-freeholders has been a source of great loss and harship to them. A fresh obligation which would add to the grievance should not, the Committee submit, be imposed upon them. A provision which saddles upon one party the burden of collecting debts for another embodies a most unsound economic principle and is calculated to produce great hardship on the landholders as a body. It should moreover be remembered that landholders have on former occasions grievously complained of the hardship thus done them and that public officers have got exceptional facilities which the landholders have not, for making collections of the dues from rent-freeholders and raiyats.

I have the honor to be
SIR,
Your most obedient servant,
RAJKUMAR SARVADHIKARI,
Secretary, British Indian Association.

BRITISH INDIAN ASSOCIATION ROOMS,
18, British Indian Street:
Calcutta, the 3rd April, 1895.

FROM

RAI RAJKUMAR SARVADHIKARI, BAHADUR,
Secretary, British Indian Association.

To

THE ASST. SECRETARY, LEGISLATIVE DEPARTMENT,
Government of Bengal.

THE Committee of the Association have watched with anxiety the progress of the Sanitary Drainage Bill in Council and they grieve to find that, far from modifying the Bill in a way which would remove the more serious objections to the measure, the alterations that have been made in it expose it to much greater objection than before.

The Committee have already submitted that no necessity whatever exists for the enactment of the proposed measure. The Road Cess Act, 1880, the Drainage Act, 1880, the Embankment Act, 1882 and the Local Self Government Act, 1885 contain provisions which are ample for the purpose of undertaking drainage works which might be found necessary either for promoting sanitation or effecting improvements in land in respect of agriculture in any local area. The Committee cannot too often repeat that the object for which the new tax is sought to be imposed is precisely the same as that for which the Road Cess was levied.

The necessity of the measure becomes still more doubtful when it is considered that competent professional opinion is divided on the question of the utility of drainage works in improving sanitation and that in fact a large majority is in favour of the opinion recorded by Colonel Haig :—"I do not look upon drainage *per se* as a complete cure or even as the principal means of cure for the fever which has so disolated the Hooghly and Burdwan districts, and unless some great and fundamental change takes place in the present conditions of agriculture and population the elements of the decease will, I believe, remain, though it may be with diminished force, in spite of drainage, and in the absence of other remedial measures, may again lead to similar mortality." This was corroborated by Dr. Lethbridge, Dr. Saunders and other responsible officers of Government.

The objections to the measure assume a grave aspect when it is considered that it involves the imposition of a cess or tax for the recovery of the cost of drainage works which the people themselves, do not want and in the decision regarding the necessity of which they would have no voice. In the present impoverished condition both landholders and raiyats would feel the levy of such a cess as an act of grievons oppression which, instead of benefiting them in the least, would reduce their means of maintaining themselves, providing themselves with means for buying proper food and clothing in health and disease and paying for medical aid and medicines when necessary, and thus predispose them more to the attacks of the fever against which the drainage is intended to be a protection. The Committee of the Association have no hesitation in submitting that the proposed Legislative measure is simply undesirable.

But not the least objectionable feature of the Bill is its provision for the recovery of the cost from persons interested in the land. The Committee feel bound to point out the iniquity and injustice of the provision, considering that by the last census barely half the population is connected with agriculture and that therefore a large proportion of those who would benefit by a drainage work would have nothing to pay while the whole burden of the cost would fall upon landholders and raiyats. Convenience in working the Road Cess Act for the purposes of sanitation is no justification for the proposed measure. The main question is whether Government should impose a fresh burden upon the Land Revenue in spite of the pledges given in 1793 and in the face of repeated protests against encroachments on vested rights. The Council should therefore get an authoritative decision of its power to impose burdens on land before passing a measure which would certainly diminish the assets of land holders and raiyats in spite of the solemn declarations made in 1793. The Committee confidently submit that the question has never been authoritatively settled and that all that the Secretary of State held on the occasion of the imposition of that debatable measue, the Road Cess, was that before the Cess was actually imposed, the authorities in India should be satisfied that it involved no breach of faith and encroachment upon vested rights. The Committee of the British Indian Association respectfully submit that to meet the objections of the Zamindars the Council may be pleased to recommend to Government to have the question finally settled by a judicial decision in an amicable suit so that no stigma may attach to any one who might venture to bring an action for the purpose. The Committee, therefore, humbly pray that the Council will graciously approve of the suggestion made above and that in view of such approval, the further progress of the Bill may be stayed for a period of three months or such other reasonable time as to the Council may seem fit.

I have the honour to be,
SIR,
Your most obedient servant.
RAJKUMAR SARVADHIKARI,
Secretary, British Indian Association.

BRITISH INDIAN ASSOCIATION ROOMS,
18, British Indian Street:
Calcutta, the 27th July, 1895.

FROM

RAI RAJKUMAR SARVADHIKARI BAHADUR,
Secretary, British Indian Association,

To

C. J. LYALL ESQ., C. S. I., C. I. E.,
Secretary to the Government of India,
Home Department.

SIR,

By desire of the Committee of the British Indian Association I have the honour to sumit for the consideration and orders of His Excellency the Viceory and Governor-General the following representation regarding the Sanitary Drainage Bill passed by the Council of His Honour the Lieutenant-Governor of Bengal for making Laws and Regulations on the 3rd instant.

From its very inception the measure was regarded by the public with any thing but approbation. It was looked upon with disfavour by most of the public bodies, officers of Government and other gentlemen who were consulted about it, and several of the responsible officers of Government who could speak with authority on the subject condemned it in no equivocal terms. Mr. Cooke, Magistrate of Hooghly, who has the largest experience of drainage works by reason of most of such works having been executed in the district under his charge, said that "Drainage works under Act VI are not altogether satisfactory precedents for Government interfering as public benefactors, and if alluded to, should be quoted rather as warnings than as examples." Instead of multiplying instances the Committee of the Association beg to quote what His Honour Sir Charles Elliott himself said in his public address at Dacca in July 1894. "The present Bill was therefore drawn up and had been widely circulated for criticism amongst members of municipalities, boards, officials and many others whose opinions are likely to be of value. Many replies had been recorded and others are still coming in, and His Honour said he had to confess that most, if not all of them, were hostile to the Bill."

It is only a natural result of its character that the measure has not commanded public support. The science of sanitation is new even in the country of its origin. In Bengal the climate and the physical conditions of the country are factors which remove the province from the operation of conclusions derived from experiments in European countries. Then again, the institutions, habits and modes of living of the people of Bengal strengthen the differences arising from climatic and geographical conditions. It is reasonable therefore to doubt whether measures, recommended as useful in Europe, would prove beneficial to the inhabitants of Bengal. This doubt has been strongly fortified by what responsible officers of Government themselves have said about the the causation of disease in Bengal. In reviewing the Report of the Drainage Obstruction Committee Mr. A. Mackenzie (now Sir Alexander Mackenzie), Secretary to the Government of Bengal said : " Dr. Lethbridge is unable to accept the view that the dampness of the sub-soil could be the sole and only cause of the fever, or that this dampness, which is general in Lower Bengal, had been brought about by roads, railways, &c." Another officer, Col. Haig, stated : "I have seen villages situated on high ground from which the levels sloped away gradually in all directions for a mile or two, and within which there was not in the month of January, and plainly could not be at any other time of the year, a vestige of a swamp; yet this had all had, the fever, all had a dismal tale of suffering to tell. It is vain therefore in my opinion to look for the origin of the fever solely in the swamps, great and small, scattered over the country."

The truth is that it is not obstructed drainage and the dampness of the country so much as the poverty of the people which should account for the high rate of mortality which is said to obtain in some districts in Bengal. The concensus of professional opinion should leave no doubt on the point. In 1886 Dr. Coates, Sanitary Commissioner with the Government of Bengal, observed in his annual report: "Outbreak of cholera in different districts throws no new light on the etiology of disease. It is owing to water-supply, impure and insufficient, inhabitants enfeebled by exposure, insufficient clothing, scanty and unwholesome food." Another eminent officer, Dr. Saunders, while Deputy Inspector-General of Hospitals, observed: "And now as to causation, Dr. Elliot has in his report given a very fair resume of the views which have been held on the subject, and he has pointed out how sanitation, or the absence of it, defective drainage, supersaturation of the soil &c, exist in many places where fever has not been markedly prevalent, and that where supposed causes are not apparent, yet that disease has been rife and excessively fatal." Dr. Saunders ascribes the lowering of the health of the people to "the total absence of all conservancy, the almost total want, at certain seasons, of proper clothing, the over-crowding in their dwellings, the almost invariable corruption of water-supply, the insufficiency of their food (looked at as nutriment) and all other conditions which I have alluded to on a former occasion."

It is therefore inevitable that the public and the influential section of the public represented by the Association should view with apprehension and anxiety such a measure as the Sanitary Drainage Bill. It involves the imposition of additional taxation for recovering the cost of works undertaken in compliance with its provisions. And it imposes an increase of burden upon the people of this province, a people suffering already from a failing stamina, and inability to resist morbific influences, and upon whom any new burden must have a disastrous and injurious effect. The alarm is the more widespread as there is no limit to the cost of such works and to the rate which may be levied for recovering such cost. The Committee of the Association beg to submit that in their present impoverished condition both landholders and raiyats must feel the imposition of additional taxation upon them as an act of grievous oppression which instead of benefiting them must reduce their means of maintaining themselves, of providing themselves with proper food and clothing, and of paying for medical aid and medicines when necessary, and thus predispose them more to the attacks of the fever against which the drainage work is intended to be a protection.

Irrespective of all other considerations no justification for the measure exists even on the ground that it is necessary for the purpose of removing a defect in the Statute Book. There are already in the Bengal Code several Acts, the Road-Cess Act (sec. 109), the Drainage Act 1880, the Embankment Act (sec. 79) and the Local Self-Government Act (sec. 87) which provide for the execution of drainage works for the purposes of sanitation and improvement of land.

But not the least objectionable feature of the Bill is its provisions for the recovery of the cost from persons interested in the land and for its apportionment on the basis of the Road Cess. It is not only persons that are in immediate possession of the land either as proprietors or tenants and whose benefit is intended by a sanitary drainage work, who would have to pay, but also all proprietors of superior grades living at distances from the scene of operation and who would be quite unaffected by the work. Landlords who have let out their estates in permanent tenures and have no direct connection with the land would have to bear a share of the cost, while merchants, traders, manufacturers, artizans and others who would be benefited in a sanitary point of view would have to pay nothing at all. This would be a new imposition on land and an increase of the land revenue inopposition to the pledges given in 1793 and in a way which admits of no justification whatever. The Committee of the Association would respectfully submit that it has been held by such eminent lawyers as Lord Bramley, Sir Erskine Perry and Sir Barnes Peacock that any imposition which reduces the profits of landholders in the permanently settled provinces is a breach of the conditions on which the Settlement was made, and they would humbly ask whether it is a wise and sound policy to {enact a legislative measure which is unnecessary and of doubtful utility, which must seriously shake the confidence of the people in solemn pledges given by Government, make them brood over wrongs repeatedly done them by breaches of vested rights and tend to create disaffection and a sense of helplessness.

Too much importance cannot also be attached to the way in which the Bill was passed. His Honour the Lieutenant-Governor said from his place in Council on the 20th ultimo that " Another reason for deferring the final passing of the Bill is that we leave an opportunity for two mafussil Members of the Council who have not yet been elected to give us the benefit of their opinion in the matter." But although one of the Members has not yet been elected, and although motion was, made to allow the Bill to stand over for three months the motion for passing it was allowed and carried by a majority of three, even though all the elected hon'ble Members, and one appointed hon'ble Members, strongly oppposed the passing of the Bill.

For the above reasons among others the Committee of the British Indian Association respectfully solicit that His Excellency the Viceroy and Governor-General may be graciously pleased to withhold his assent to the Sanitary Drainage Bill.

I have the honour to be
SIR,
Your most obedient servant.
RAJKUMAR SARVADHIKARI,
Secretary, British Indian Association.

BRITISH INDIAN ASSOCIATION ROOMS,
18, *British Indian Street*:
Calcutta, August 8, 1895.

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FIVE YEARS' PRACTICE

AMONG THE

Village Population in India;

WITH AN ANALYSIS OF 10,865 CASES.

A THESIS

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SUBMITTED TO THE

MEDICAL FACULTY OF THE UNIVERSITY OF GLASGOW,

BY

JAMES M. MACPHAIL, M. A., M. B., C. M.,
CHAKAI, BENGAL.

JUNE 1895.

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CHAKAI, BENGAL.

JUNE 1895.

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FIVE YEARS' PRACTICE

AMONG THE VILLAGE POPULATION IN INDIA.

Period.

THE five years referred to in the title of this thesis date from the 14th of February 1890, to the 13th of February 1895, the record of cases having been closed at the latter date in order to make it possible to classify the cases according to the twelve months of the year, to demonstrate the influence of the seasons on the various diseases.

District.

The first seven months of the time were spent at Pokhuria, a Mission station in Manbhum, one of the districts which constitute Chota Nagpur, about 180 miles north-west of Calcutta. The rest of the work was done in Chakai, about 50 miles north of Pokhuria, on the southern borders of Monghyr, a district in the province of Behar, lying partly on the north and partly on the south side of the Ganges. As these two stations, Chakai and Pokhuria, closely resemble each other in climate, population and social conditions, the nature of the medical work done in each was practically the same, the only marked difference to be noted in the statistics being the much larger proportion of native Christians treated during the first year owing to the fact that Pokhuria is a mission station of longer standing than Chakai. The boundaries of Hazaribagh, the Santal Parganas and Bhagalpur join those of Monghyr in the neighbourhood of Chakai, and patients came from these districts in considerable numbers, as well as from some more remote.

Population.

The population of this part of India is a very mixed one, consisting of (1) a few caste Hindus of the orthodox type, Brahmans, Rajputs, Bhabhans, Banias (shop-keepers) Kayasths (wri ters); (2) a few Mohammedans, many of them Julhas or weavers; (3) a great mass of the class known as "semi-Hinduised aborigines" or "the depressed castes"—Goalas or Cowkeepers, Chamars or leather-workers, Hadis, Doms and others of the Sweeper castes, Dusadhs, a thieving caste, and a great multitude of others, all occupying a very inferior place in the social scale and nearly all extremely poor; (4) the entirely distinct jungle tribe of Santals, with the closely allied Kols (iron-workers,) Mahlis (basket-makers) and Birhors (gypsies)—a people who, resisting the influences which have gradually drawn the other aboriginal tribes within the pale of Hinduism and obliterated their distinctive features, have maintained their primitive customs, their demon-worship, their patriarchal system of village government, their tribal traditions and their honest, straight forward and independent character, almost intact to the present time. To these must be added (5) the native Christians who have been drawn almost entirely from among the Santals and Kols. As the mission in connection with which the medical work is done works chiefly among the Santals, and as Chakai mission station is situated in a place where for several miles in every direction the population consists with rare exceptions of Santals, both they and the Christians occupy a more prominent place in the statistics than they do in the general population. The Hindus and Mohammedans travel long distances on foot to be treated for what often seem to be very trivial complaints, but the Santals, unless the means of relief are very conveniently near, are on the whole very indifferent to the advantages of western medicine, and as they are a strong, muscular people, leading a very active life in the open air and happily free from the baneful customs of child marriage and the seclusion of women,—customs which cannot but have a deteriorating influence upon the health of the well-to-do classes in India,—they are comparatively seldom afflicted with serious illness.

Social The people live in scattered villages, those of the Santals and very often built in remote parts of the jungle or among the hills, while the other classes occupy larger villages in more accessible places. The Santals live by cultivation and hunting, the others by cultivation alone or the industries that depend upon it. The well-to-do class constitute a very small minority, consisting of the landlords and their officials, the shop-keepers and the money-lenders. The wage of a working man is two annas (two pence) a day, while the women work for 1¼*d.* a day. Very few of the people, however, have an income at all equal to two pence a day, for agricultural employment is limited to certain seasons of the year. The great majority of the people are exceedingly poor, living just on the verge of starvation but probably suffering less than many others do in times of scarcity because their chronic poverty has taught them to eke out a living on the products of the jungle. The deciduous *mahua* tree (*Bassia latifolia*) yields a fleshy, succulent flower, which falling to the ground in the early morning in March or April, is gathered by the poorer people, dried in the sun, and used either cooked or raw as the main article of food for several months. Besides this, many roots, fungi, leaves, young shoots of bamboos etc, are common articles of diet. Few of the poorer classes have any scruples about eating animal food of any description. The large rock snake is eaten by the Santals who also eat snails, rats, ants, etc, while some of the other tribes are termed " frog-eaters." Rice is a luxury enjoyed by the poorer only during the time of harvest and the few following months when it is cheap; but nearly all classes share in the Indian corn which ripens in August or September and so fills up the gap between the *mahua* season and the rice harvest. The clothing of the people is entirely cotton. Country cotton is made in nearly every village, and is much warmer, thicker and more durable than the Manchester article, but the cheapness of the latter makes it the more popular. Most men wear a waist cloth, and when they wish to appear dressed, a cloth or *chudder* over the shoulders, but when they are at home or working in

Food.

Clothing

fixed like a T bandage to a string round the waist and passed between the legs. The female attire is the *sari*—a piece of cloth about a yard wide and of any length the woman can afford up to six yards, fastened round the waist and thrown over the head or shoulder.

Elevation.

The district forms a plateau, 800 to 1,100 feet above the level of the sea, and sloping down to the plains of Lower Bengal on the south and to the valley of the Ganges on the north. It is hilly, Mount Paresnath 50 miles south of Chakai, rising to a height of 4,479 feet, while lower ranges not more than 2000 feet high run east and west in the neighbourhood of Pokhuria and Chakai. Masses of rock abound, and the soil, generally very dry, is in many places sandy, gravelly, or full of mica. The nature of the country with its many hills and general elevation, and of the soil, affords good natural drainage, and the humidity of the atmosphere is probably less than in any other part of Bengal.

Seasons.

The seasons are the cold season from November to February, the hot season from March to the middle of June and the rainy season from the middle of June to the end of October. Since July 1893 I have registered the rainfall for the Government Meteorological Department, and give here the monthly fall in inches for the two years 1893 and 1894 :—

Rainfall.

	1893.	1894.
January	·78	·00
February	3·77	·36
March	·45	·12
April	·30	·09
May	4·40	2·17
June	18·10	15·67
July	15·32	18·14
August	4·51	14·09
September	13·32	6·04
October	3·10	7·86
November	·01	·63
December	·00	·00
Total ...	64·06	65·17

Both of these years, I believe, were marked by excessive rain, and I do not think the average rainfall would amount to more than 50-55 inches. The regular rains—the south-west monsoon—set in very regularly about the middle of June, but they are usually preceded by heavy thunder storms in May. June and July were the wettest months in these two years, and December the only month in which there was no rain in either year. I have not kept a record of daily temperatures, nor am I aware of any record which has been kept of them in any part of the district during these five years. The Statistical Account of Bengal gives the mean temperatures at the head station of Monghyr for 10 years, from 1865 to 1874, but observations are no longer made there. The climate, however, is probably but little changed and I give here the average mean maximum and minimum temperature of each month for the ten years :—

Temperature

	Mean maximum temperature.	Mean minimum temperature.
January	81·0	52·5
February	88·8	59·6
March	95·5	66·2
April	99·9	72·3
May	100·7	74·7
June	96·4	76·9
July	90·6	75·5
August	89·9	75·7
September	91·5	73·6
October	86·4	67·8
November	82·7	57·7
December	77·5	53·9
Mean temperature for whole year ...	90·0	67·2

In the ten years' readings, the highest temperature given is 109° in May 1870, and the lowest 41° in January of the same year. Monghyr head station is about 60 miles north of Chakai but, situated on the Ganges, it is lower, and the temperature is probably about the same. The highest temperature I have seen in the shade of the verandah of my bungalow has been 113°, in May, but I believe it was higher on one occasion when I was from home. 110° is not an uncommon temperature in May, and for weeks together the thermometer may not fall below 80° at any point in the twenty-four hours. The lowest temperature I have observed was 38·8°, taken on the grass, just before sunrise in the month of January. I am told that hoar frost is sometimes seen in the early morning, but I have not seen it. Sudden changes of temperature are not uncomnon, as when a thunderstorm in May brings it down from 110° to 80°. May is as a rule the hottest month and January the coldest. In the above table, the month when the variation between maximum and minimum is greatest (29·3) is March, but February resembles it very closely in this respect (29·2).

The circumstances in which the medical and surgical work is carried on have not afforded opportunities for scientific research or original work of any kind, but a simple record of the cases treated may be of interest for at least two reasons.

Population characteristic of India.

In the first place, the patients come from that village population which constitutes 90 per cent. of the people of India. They are the villagers, the people most characteristic of the country, following their ancestral occupation of cultivating the fields and living the life which their fathers have led from time immemorial. Western civilisation has as yet hardly influenced them; their primitive wooden ploughs, single handed and drawn by bullocks,* and the few other agricultural implements they possess, their little huts built of mud and thatched with grass, their straggling villages, rank with vegetation in the rains and innocent of any arrangement whatsoever for drainage or for the disposal of refuse, are among the " unchanging" things of the East.

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* Bishop Thoborn an American Missionary in India, in his *India and Malaysia* (p. 33) states that while the Patent office at Washington contains no less than six thousand models of improved ploughs, which have been deposited there by American

Habits and customs, daily occupation, food and clothing, are all according to the pattern which has been followed for centuries. Kerosene oil is now replacing the home-made castor oil for lighting purposes; and Manchester cotton is driving the country cloth out of the market, and the cheap umbrella of European make is becoming extremely popular among all who can afford such a luxury, but, apart from these, western imports are very few. A machine for crushing sugar-cane has gained a footing among agriculturists, but it is about the only instance of a labour-saving machine for agricultural purposes commending itself to their approval. The extension of the railways and roads, and the progress of popular education—still very slow but perceptible—may promote a more rapid change of social and economic conditions in the future; but in the mean time we have here a people who, compared with Europeans, may be said to belong not merely to a different continent but to a previous age, ignorant of what we consider the simplest comforts or even the necessaries of decent life, but also entirely free of the pressure and worry of our modern civilisation.

Pioneer medical work

In the second place, most of the work recorded here is pioneer medical work. A dispensary or any regular system of medical relief never before existed in Chakai, but the district was visited occasionally by a senior colleague when on tour, who sometimes spent a few months in it at one time. To the great majority of the patients, the dispensary has afforded the first opportunity in their lives of availing themselves of western medicine and of comparing the efficacy of our methods of treatment with that of their own. The people have for the first time seen teeth extracted and chloroform administered, and it has come to them as a revelation that teeth can be extracted and that a man can be cut without feeling pain. The barber has hitherto been the only surgeon known to the villagers, and his operations have consisted mainly in scarifying or cupping in a rude way. The red hot iron, however, to relieve pain, and a piece of rag dipped in oil, set on fire and applied to the skin over an enlarged spleen or tumour, have for long been common domestic remedies. So ignorant of our remedies are some of the people that it is found necessary to tell them *not* to eat the dispensary ticket, nor the paper in which powders etc. are supplied to them. Our common domestic measures—tumblers, wineglasses, cups or spoons—are unknown to them, our system being to put marks on the bottles instead. Even the hours of the day have no meaning to any but a very few of the people, the common way to fix an engagement being to point to a certain point in the sun's course across the heavens and tell a man to meet you or come to the dispensary when the sun is *there.* The people, too, have the haziest ideas about their own or their children's ages, and consider it unreasonable that on such a subject they should be expected to know more than the doctor. For two or three years mothers remember how many seasons have passed since their children were born, but the nearest approach they can make to fixing the date more definitely is to say that the birth took place at the time of the rice harvest, or when the *mahua* flowers were falling, or as a well-known festival was drawing near. After three or four years they seem to lose count altogether. Adults when asked to give their age often state the number of their children, and old men state that they were grown up at the time of the Mutiny or when some road was made. Another peculiarity of the people is their obstinate and superstitious objection to mentioning the names of the female members of the family. The Santals have a belief that the demons who cause "all the ills that flesh is heir to" acquire a special power over their children if once they learn their names; the child's real name, therefore, is kept a family secret, while an assumed name is used when the child has to be mentioned in public. A mother is very seldom spoken of or addressed except as "the mother-of-so-and-so," and wives think it indelicate to allude to their husbands except as "the father-of-so-and-so." Husband and wife, even in private conversation, address each other as the father or mother of one of their children. These customs often lead to confusion in registering patients, for a woman has as many names as she has children. So completely is the identity of the mother lost in the child that the former sometimes seems really to forget her original name, and certainly no one else thinks it worth while to remember it.

To determine what diseases are most prevalent in these primitive conditions of life, and what influence, if any, the seasons with their marked climatic differences have upon them, the annexed tables have been prepared. But before I had been long in practice among the people I found that several disturbing elements entered into the inquiry and made the production of a thoroughly accurate and adequate record, of the kind aimed at, practically impossible. Of these disturbing influences the following are the chief:—

Disturbing elements in Statistics.

1. In the first place, many conditions which are regarded by us as pathological are looked upon by the people here as among the ordinary conditions of life. Only a small portion of those who have fever think it necessary to take medicine to cure it, and a working man with quotidian fever of a mild type, will sometimes, if the paroxysms occur only after working hours or during the night, remain at work without reporting himself as ill. I know at least one old Santal chief, an exceptionally intelligent man, who declares that he does not feel satisfied unless he has at least one good attack of fever every year. Skin disease, also, is almost universal, and many as the cases are that come for treatment, they only represent a selection of the sufferers—the more serious cases or the persons who have leisure to attend the dispensary. Intestinal worms are, I believe, extremely common, but very few cases are met with in practice, and even the few who have been treated for worms, have in the most cases complained, not of the presence of worms, which they only mentioned in answer to questions, but of such symptoms as wasting, diarrhœa, pruritus etc. One day, for instance, a Mohammedan police official brought to me a young child whom

Diseases ignored.

he had adopted and who, he said, suffered from diarrhœa, wasting and dyspepsia. When I asked him what the stools were like he replied that the child had passed one just outside the dispensary and on going to look at it I found an *ascaris lumbricoides* six inches long. These, the man admitted, were often present, but he had not considered it necessary to mention the fact. A dose of santonin and castor oil was given, and the official returned in a few days to say that the child had passed three hundred worms (an Oriental exaggeration, obviously,) and was much better. Night blindness is also common but seldom complained of, and the same remark applies to moderate enlargement of the spleen, slight anæmia, tumours not painful or oppressive by their weight or obstructive, and generally to diseases which are not painful and do not seriously inconvenience the patient. I am not aware that the people here, like the negroes on the Congo, deliberately produce a skin disease such as keloid on their faces with the object of personal adornment,* but the Santals always in boyhood burn three marks upon the dorsal aspect of the left forearm just above the wrist, that the cicatrices may remain through life as the badge of their tribe.

Symptoms exaggerated.

2. On the other hand, patients often come seeking relief, not for the real disease from which they are suffering, but for some trivial symptoms connected with it. There are three symptoms, especially, for which treatment is being constantly asked—parched mouth, burning urine, and impotence. The people say "my saliva is dried up or exhausted," or that their urine is "hot" "red" "like mustard oil" "like horses' urine" "fighting" or "angry" but when questioned will add that they have fever every night, or every second or third day. When impotence is complained of the case very often turns out to be one of anæmia or chronic fever. The statement of these symptoms usually leads one who is familiar with the people to a correct diagnosis, but the habit suggests that the people while they ignore many serious ailments, exaggerate the importance of minor ones. A

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* Davidson's *Hygiene and Diseases of Warm Climates*, p. 993.

man may have fever every night without ever thinking of seeking relief, but he will walk twenty or thirty miles to consult you about the high colour of his urine.

Superstition.

3. Even the people who trust us most have often a secret conviction that when things come to the worst there is nothing to equal their ancestral methods of treatment. The Santals believe that the anger of the disease-causing demons is to be averted or appeased only by sacrifice*; and to a devout Hindu a vow that if his life or the life of one dear to him is spared, he will make a pilgrimage to a distant shrine, is a *dernier ressort* when all else has failed. In some cases people who were very friendly personally have sought to conceal from me the existence of serious illness in their homes or the fact that a patient I had been treating had become worse, afraid no doubt that my interference would still further infuriate the malignant spirits or neutralise the effect of some religious rites. Apart from any religious conviction, however, many of the people openly avow their belief in charms even when applying for medicine. I had at one time the skin of a bear that had been killed in the neighbouring hills lying in the verandah which served as a dispensary, and the people who came for medicine were often much more eager to get a few hairs from it—a specific for many diseases—than to get the drugs I offered them. Very commonly the patients wear charms round their necks, or round a swollen limb,—shells, tigers' teeth, twisted pieces of root etc,—and would rather throw away our medicine or refuse our surgical help than part with these sacred possessions.

Midwifery.

In this connection I may state that my midwifery practice has been practically *nil*. Only once have I been called to a case of labour, and then the patient was a cow who was in a state of extreme exhaustion and who, I am sorry to say, died undelivered. This, I believe, is not wholly due to an unwillingness to be attended to by a man or a European, because this objection does not exist among the Christian women nor among the neighbouring Santals, who, in the few cases of uterine disease that have occurred in my practice, have shewn very little hesitation in consulting me or in allowing me to make the necessary examination. It is mainly due to the conviction that they know far more about these things than I do; besides, they have always regarded midwifery as the monopoly of midwives and a thing with which doctors have nothing to do.

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* The last human sacrifice known to have occurred among the Santals took place in 1878 in obedience to a vow made in sickness. A nephew of the man who offered it is now my medical assistant and compounder.

Field work.

4. Among the poorer class of cultivators, who constituted probably 90 per cent. of the patients, everything has to give way, at certain seasons, to work in the fields. When the rice is being transplanted in July—a laborious operation done entirely by hand—or when it is being harvested in the winter months, no one has time to think of his own or of any one else's ailments. A patient, male or female, hardly ever comes to the doctor unattended, and in the case of women the attendants often include the whole family. Seeing a European doctor is too great an ordeal to be faced alone. Thus in the busy season, when men, women and children are all at work in the fields, planting or reaping the rice upon which their very lives depend, persons seriously ill may be lying in the huts, but no one has time to attend to them or to convey them to the dispensary. The seasons, therefore, affect the returns, not only by influencing diseases but also by making it easy or difficult for the people to attend to them. One sad feature in the life of the poor is that many of them are virtually slaves; they have sold themselves and even their wives and children in payment of debt, binding themselves to work for their masters without pay whenever the latter demand their services. This system, I believe, is now illegal but the people are too ignorant to avail themselves of the protection which British courts would afford

Indifference.

5. To the above may be added the indifference of the people to the value of life. Human life in cheap; the cows and bullocks cost more than the wives. Little value is attached to the lives of the old, the deformed, the imbecile. If they can be cured easily, speedily, without trouble to their friends, these friends may put themselves to a little trouble and expense in bringing them once for medicine; but they will not put themselves to the trouble of returning for repeated consultations, or even for renewing their medicine. Not only are the people indifferent to the welfare of others, but they also lack perseverance in following out any treatment prescribed for themselves unless they see immediate results. This lack of enterprise and the unwillingness to take trouble seriously interfere not only with the treatment but also with the diagnosis of disease. People cannot be relied upon to return with specimens of urine etc. for examination, or to report the effect of treatment. Unless they can be cured on the spot, they are apt to lose heart altogether. It should be added, however, that many of the people find it very hard or even impossible to make repeated visits owing to the distance at which they live, and in a district where there are very few roads and no bridges communication with places comparatively near may be cut off for days together in the rainy season.

Camp work not included

No attempt has been made to keep a record of all the cases treated, for a considerable part of the medical work has been done in camp in circumstances which made it impossible to tabulate the particulars. Each cold season a period varying from six weeks to four months has been spent on tour, and as the camp has often been pitched in districts much more densely peopled than the Santal country which surrounds the mission, and amongst a population consisting mainly of Hindus and Mohammedans who are always much more eager for medicine, and much more in need of it than the Santals, the numbers treated have often amounted to several hundreds daily. Medicine has been dispensed in camp for about 14,000 persons in all but at least half of these persons were treated for scabies. In many of the crowded districts this disease is practically pandemic during the cold season, and the numbers treated were limited simply by the amount of sulphur available—a drug which has now to be ordered by the hundred weight. Even if it had been possible to keep a record of all the cases treated, the returns of the camp work would have shewn an overwhelming majority of cases treated during certain months of the year, a majority due not to the incidence of disease at certain seasons but to purely accidental circumstances in connection with my movements on tour. The analysis of cases, therefore, is limited to those treated at the dispensary, for 6 or 7 months at Pokhuria and for the rest of the time at Chakai. The dispensary has been kept open during the whole year and in my absence the work has been attended to by an educated Santal, who, although he has no recognised medical qualification, has worked as a compounder for about ten years, and I believe his diagnosis of the common diseases may be accepted as generally correct. I have had many opportunities of testing the accuracy of his returns and do not think the errors in them are so numerous as to take away from the value of the observations made. Cases which have been visited in their own homes have been included in the returns, for these have been entered in the dispensary books and their medicines supplied from the dispensary stock. A few of the cases, therefore, are of a kind not usually seen in dispensary work, e. g. post-partum hæmarrhage.

Hospital work.

During most of the time, from the beginning of the work till June 1894, there was no hospital, and this necessarily limited the amount of surgical work. A few surgical cases, chiefly cataract, were accommodated in native huts or in a school, or in the verandah of the bungalow, but very little in the way of major surgery could be attempted, except in cases of emergency. In June last, hospital accommodation for twelve persons was furnished in connection with a new dispensary which was opened.

do not take kindly to hospital regime. The wards, twenty feet by twenty one, seem big, bare and cold compared with their own little mud huts, with no aperture but the door. If a patient dies in a ward the others fly in terror of the disembodied spirit which is believed to haunt the place for sometime afterwards, and refuse to return. In nearly all cases several members of the family, sometimes the entire family, insist upon accompanying the patient, and while they relieve one of the trouble of cooking, sweeping and nursing, they are not inspired with any enthusiasm for the principles of Lister. On one occasion, a band of travelling Mohammedan gypsies occupied the hospital for a fortnight while two of their number were successfully operated on for cataract.

The Tables.

In Table I, an analysis of patients according to race and sex, the total number is 10,865, while in Table II, an analysis according to the months of the year, the total is 11,106. The explanation of this difference is that the particulars of 242 cases treated during the latter part of November and during the entire month of December, 1894, have been lost. Thus while the total number treated was 11,107, all the analyses, except in Table II, have been based upon the number of which a full record was preserved—namely 10865. Table III, containing a complete list of diseases, will be found to give a total of 11053, an excess of 188 over the number of persons treated (10865), this excess in figures being due to the simple fact that the diseases were in excess of the individuals. When two ailments from which an individual suffered were quite dstinct from each other, of different origin and demanding different treatment, as, for instance, cataract and itch, the case has been entered twice in the list of diseases but only once in the list of patients. For reasons already explained, the numbers attending the dispensary vary with the seasons and especially with the course of agricultural work; so in Table IV, which contains an abstract of the more prevalent diseases (diseases of which more than a hundred cases were seen) in the order of their frequency, not only is the number of each disease treated in each month of the year given, but also the percentage of that number to the total number of cases for the month. Thus, to take the first entry in Table IV: of Scabies the total number of cases was 1971 or 18·14 percent of the total. In January the number was 173, and the total number of casess treated in January (see Table II) was 747. So of cases treated in January scabies accounted for 23·15 per cent., considerably over its average percentage for the whole year (18·14). Thus the relative as well as the absolute frequency of the disease in each month is given; and when it is found that in any one month the number of cases of any disease is both absolutely and relatively greater than in any other month, this may be regarded as conclusive evidence that the disease is then most prevalent, or prevalent in so severe a form as to induce those who suffer from it to seek relief. Table V is a more minute analysis of the fever cases, and Table VI is a supplementary return, given for purposes of comparison, in which the number of children who were absent for half a day or oftener from sickness in each month of a school year is noted, along with the percentage of that number to the number of children or the roll for the same month

Table I Race and Sex.

Table I shows that of the total number of patients 72·42 per cent. were Hindus or Hindused, 5·03 were Mohammedans, 14·47 were Santals or Kols, and 8·01 were Christians. The census of 1891 gave the proportions of population of South Monghyr as 90·05 Hindus, 9·43 Mohammedans, and others ·52. But a good many patients were drawn from the districts of Hazaribagh and the Santal Parganas where the proportion of "others" (chiefly Santals) is greater than in Monghyr. But among the patients the proportion of Santals and Christians is, as has been stated already, for natural reasons, greater than among the general population. The dispensary is located among Santal villages with a number of Christian families and school children in its immediate neighbourhood. The portion of Hindu and Mohammedan women is perhaps larger than one would have expected, because the people are as a rule too poor to be able to adopt the *purdah* or *zanana* system (the seclusion of women) which is really one of the luxuries of the well-to-do. The difference in the numbers of men and women is only partly due to unwillingness on their part to see a male doctor, being largely accounted for by the fact that they are physically less able than the men to travel considerable distances to the dispensary and that the nature of their work makes it more difficult for them to leave home. On one occasion I was called to undertake a day's journey to see a Hindu lady suffering from corneitis. The lady was brought to the verandah without any hesitation, and no objection was made to my unveiling her face and examining her eyes; but another of the zanana ladies in the same household wished my advice about a swelling in her foot and persistently refused to offer me any facilities for examination beyond extending her hand from behind the door of her apartment that I might feel her pulse. But cases in which any serious objection is made to a woman being seen by a European male doctor are in this district comparatively rare.

It is among the Christians that the proportion of men and women approaches most closely to equality (28·35 and 21·69), and I believe this fact, and also the very much larger number of Christian children treated, are due not so much to the proximity of the Christians to the mission, for a much larger population of non-Christians are almost equally near, as to the higher value which they have learned to place upon the lives of women and children. The term "children" in this table means all up to the age of twelve, inclusive. Among strict Hindus and Mohammedans this rule would classify many married women among the children, but marriage very seldom takes place among the Santals before the age of puberty, and although among the Hindus a girl's marriage may he celebrated when she is six or seven, she does not cohabit with her husband until she is grown up. The Act of 1891 which raised the age of consent from ten to twelve and made it criminal for a husband to conmade no change in the social life of this district although it met with furious opposition in Lower Bengal and elsewhere.

Table II Influence of seasons

Table II shows that, according to the number of patients treated, the twelve months of the year ranked thus:—October, September, March, June, May, November, April, August, February, July, January, December. The numbers for the first five months were in each case above the average while in each of the last seven months less than an average number were treated. October was by far the heaviest month and December the lightest, 13·43 per cent. of the total number having been treated in the former month and only 4·78 in the latter. Yet it cannot be ascertained that any one disease was particularly prevalent in October. Several diseases were more numerous in October than in any other month, but splenic enlargement is the only instance in which the number for October was both absolutely and relatively greater than for any other month, and the cases were not sufficiently numerous to affect the totals perceptibly. A number of acute diseases were less numerous in October than in some other months and not even chronic cases were invariably more frequent. The frequent occurrence in October of the *Durga puja,* the great annual religious festival in Bengal, when all work is suspended for days together and when for the time being the dispensary is deserted, makes the large number treated in that month all the more remarkable. The general explanation seems to be that it is at once an unhealthy time of the year, marked by the cessation of the rainfall with a rapid drying up of the ground and a falling of the rivers, and a season when the people find themselves comparatively free to attend to their ailments. But it is by no means the idlest time of the year, for although the Indian corn has been gathered in and the rice is not yet ripe, yet the latter crop is ripening in the fields and must be vigilantly watched all night to prevent its being stolen. During the day, however, the peo-

In September, which ranks second, four diseases were relatively and absolutely more prevalent than in any other month,—toothache, ringworm, headache (which was probably fever or a sequela of fever) and otorrhœa. In March, catarrh was more frequent than in any other month, and fevers, lumbago, headache, abscesses and anæmia, were above the average. In June, conjunctivitis, ulcers and keratitis were absolutely, and dyspepsia and rheumatism relatively most numerous.

The four months which head the list are months of seasonal change—September-October marking the change from wet to cool, March from cold to hot and June from hot to wet.

The low number in December is certainly due to the rice harvest, for the month is by no means a healthy one although to a European the Indian climate then seems to be almost perfect. The sunshine is brilliant, the air clear and bracing, and the earth has not yet lost the greenness of the rains. But it is the time when the death rate among the natives in Calcutta is generally highest. Fever is then very prevalent and in this district among sections of the population scabies is very general. The work of harvest, threshing, winnowing and storing the rice, is prolonged into January and accounts for the low number in that month also. July again, is the month for transplanting rice. April and May would have exhibited a better bill of health had it not been for an epidemic of influenza in 1890.

Table VI School statistics.

Comparing the figures in Table II, with those regarding school attendance in Table VI, we find one or two striking differences. The very small amount of sickness in May is due to the fact that the school was closed for three weeks during that month, for holidays; 5·00 per cent. sick in one week would represent 20 per cent. in the month, and striking the average with the latter figure for May gives a monthly percentage of 38·20. August, September, December, October, March, July, all above the average; while February, June, April and May are below the average and show declining returns of sickness in the order named. In August not only was the figure representing sickness higher by far than in any other month, but the only two deaths which occurred among the school children during the year, took place in that month. The main differences between the results of the school statistics and of the others are to be explained by two circumstances:—

(1) The great majority of the illnesses among the school children were fever, with conjunctivitis, diarrhœa and itch more rarely;

(2) The work in the fields did not keep them from being reported as sick. The school statistics will be found to follow pretty closely those of fever, a fact to be referred to again; but it may be observed here that the two months which in both tables show a percentage below the average, February and April, may be considered as exceptionally healthy months.

The latest mortality returns of the Government of India, for 1893, show that over the whole of India the last three months of the year were the most fatal, and this is said to be the general rule.

Table III Classification of diseases.

In Table III, the classification of diseases has been in some cases perplexing, but the general rule has been to describe and tabulate a case according to its most prominent clinical features. A large number of fever cases, for instance, suffered from spleen and anæmia, but if a patient was suffering from fever at the time, if he had fever when seen or gave a history of quotidian, tertian or quartan paroxysms or of low fever of a more irregular type, the case was put down as fever. Cases classified as spleen were all severe cases of enlargement, so severe as to inconvenience the patient and make him anxious for relief; and similarly the anæmic cases are those in which anæmia was the symptom which seemed to demand first attention. Nearly every patient could give a history of fever at some period not very remote,

and nearly every patient seen would have benefited by a course of anti-malarial treatment. A few of the cases were not seen personally, but were treated by proxy; they were unable to come to the dispensary and lived too far away to be visited, but such cases were only registered when there was no uncertainty about the diagnosis.

Fevers.

Fever is, next to scabies, the most common disease, but by no means so common as it is in some other parts of India not very remote from this district. Fevers constituted 15·14 per cent. of all the cases, but at a dispensary in Lower Bengal (Hooghly District) opened recently by a colleague I found on inquiry that the proportion of fevers among the patients was 50 per cent., and it was believed to be much higher in the rains; while the deaths attributed to fever in India in 1893, according to the Government returns, reached the enormous total of 4,500,000, equal to 1 in 62 of the population.

Table V

In Table V, it is shewn that August was the month when the fevers were relatively the most numerous, forming 21·68 per cent. of the total for that month, and in Table VI. August is the month both with the largest number and the largest per centage of cases of sickness in the school, cases of which the large proportion were fever. Of the two deaths which occurred in school in that month one was a case of high fever with coma, death taking place within twenty-four hours of the time when illness was complained of; in the other case I did not see the boy till he was dead. His illness had been of two days' duration and the symptoms described suggested, as the only explanation I could think of, a pernicious attack of fever. My impression is that fever is not only more prevalent but also of a more severe type in August than in any other month. Why this is so it is not easy to say, for August is not a month marked by any peculiar climatic conditions, nor is it a time when diurnal range of temperature is not so great as at some other periods, and the rainfall is often less than in the two preceding months. The rain, beginning about the 15th of June, falls almost daily till the end of July. In August it becomes more irregular, with intervals of sunshine extending at times to a week or more. The heat during these intervals, although not registering so high on the thermometer, is, owing to the saturation of the atmosphere, of a different and more trying kind that the dry heat of the hot weather. It is more exhausting and depressing and the sudden change which takes place when the rain recommences may be on that account more dangerous. These features of the month, however, are not peculiar to August, for very similar conditions prevail in September, when the proportion of fever cases is considerably less (15·09), approximating to the average. The only distinctive feature of August, as far as I can observe, is, that then the sun as a rule *begins* to act upon a soil saturated with moisture. After August, December, November and March follow in the order of their proportion of fever cases, and September, December, October and March are the months when sickness was very prevalent in the school. The drying-up season after the rains and the beginning of the cold season is said to be generally the worst time for malaria in India,* and in this district the change of season from cold to hot in March, with hot days and cool nights, seems to come next. My own experience inclines me to believe that a common determining cause of fever is chill. I have frequently observed that a party of men in camp with me in November and December suffered less from fever than their wives and families who were living at home in their huts. My work in camp has never been impeded by the illness of the men, but very frequently considerable inconvenience has been caused by their having to go home from camp on account of the illness of their wives and children. When at home the people shut themselves up at night in their little huts, with a blazing fire, or with earthen vessels of smouldering charcoal beneath their cots. After

Influence of chill.

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* Fayrer, *Climate and Fevers of India*, p. 42.

spending the night huddled together in this suffocating atmosphere, they are exposed, with very little clothing to protect them, to the cold of the early morning when the temperature may be not very many degrees above freezing point. The men in camp, sleeping in a tent, suffer more from cold at night, but they breathe a purer air and are less likely to be chilled in the morning. During the five years, I have had eight attacks of fever myself—the first in March 1890, due, I believe, to sitting in a cold draught in the evening when perspiring after a rapid walk, followed by a slight attack, a recrudescence probably, in May. There was no return till November 1893 when, after a heavy rainfall, fever was very prevalent. This attack I attributed to wearing damp clothes. I was in camp in a small tent made of cloth not thick enough to keep out the heavy dew, which reached my clothes hanging round the sides of the tent. This was followed by attacks three weeks later in the same month, twice in February, in June and in August 1894. The temperature never exceeded 105° (as far as I know), and the one attack never lasted more than four days.

Influence of heat—a contrast.

May, the hottest time of the year, is the time when fever is most rare. In this respect there seems to be a marked difference between the fever of India and that of temperate zones. Laveran[*] states that in Rome the first case appears almost exactly on the same day at the beginning of July, and that in Algeria also the malarial fever is in abeyance during the cold season and prevalent from June till November. Marchiafava and Bignami[†] classify malarial fevers into two main groups, (1) mild malarial fevers, quartan and tertian, of winter and spring, and (2) severe summer-autumnal fevers, quotidian and malignant tertian. Birch,[‡] writing of India says that 60 per cent. of the deaths from fever among natives occur in November—February, and 70 per cent. of the deaths among Europeans from May to October.

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[*] *Paludism*; New Sydenham Society, p. 101.

[†] *On Summer—autumn Malarial Fevers*, New Sydenham Society, p. 5

Undefined cases.

In classifying fevers according to type, a large number of cases are of necessity put down as undefined, because there was only one paroxysm which did not recur, making it impossible to say whether the fever would have been, if untreated, quotidian, tertian or quartan. Of my own eight attacks, four were of this type, but these were secondary attacks. The others were quotidian, lasting two to four days. In other cases, it is impossible to make the observations necessary to determine whether a non-intermittent fever is continued or remittent; and there are also a number of cases which cannot be classified as anything but irregular, often low fever, occurring every two or three days with varying intervals.

Frequency of quartan.

The most striking fact elicited by this analysis is the comparative frequency in this district of quartan fever which is generally regarded as a rare form in India and especially in Lower Bengal. Waring, quoted by Fayrer,* gives the following analysis of fevers in India:—quotidian 79·7 per cent.; tertian 10·1; quartan 1·8; double tertians 2·1; irregular 0·17. and adds that the proportion of quotidian was larger by 16 per cent. in the Bengal than in the Madras returns, and the tertian about 15 per cent. less. Chevers is quoted† as saying that he never in 27 years' practice saw tertian in a native or a case of quartan at all. Much more recently, Crombie ‡ says he has had only to treat one case of quartan in the whole of his 22 years' service in India. He gives 90 per cent. as the general proportion of quotidian and 10 of tertian. Davidson ¶ seeks to demonstrate that the proportion of tertian and quotidian varies according to the latitude and gives the proportion of quartan in India as 1·1 per cent ,while in Sweden it is 16·4, in Vienna 7.8 and in Algeria 0·5. Tertian in India is 23·1, in Sweden 57·1, in in Vienna 47·8, in Algeria 28·6. Quotidian is 70·7 in India,

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* *Climate and Fevers of India* p. 68.

† Ibid p. 66.

‡ Address to the Calcutta Medical Congress, Dec. 1894. *Indian Medical*

26·4 in Sweden 41·3 in Vienna and 70·9 in Algeria. His theory is that fevers with a longer interval indicate a milder type of infection, so that as we approach the tropics quartan and tertian become relatively less frequent. His own figures, however, show quartan to be less frequent in Algiers than in India, and in Waring's returns, quoted above, quotidian is said to be 16 per cent. more common in Bengal than in Madras which is further south. The fever met with in Rome, often with death from coma in 48 hours, is said to be of a severer type than that met with in India* and Maclean† says that out of 98,237 cases of intermittent fever in the army of the United States during the great war, 51,602 were quotidian, 44,875 tertian, and only 1757 quartan. That is to say, the quartans were only 1·78 per cent; a proportion not much larger than in India according to Davidson's figures, and a little less according to Waring's. The interval may depend upon the virulence of the infection, but the virulence of the infection does not seem to bear a constant relation to the latitude.

Several facts, however, do point to the conclusion that the explanation of the frequency of quartan fever in this district is that fever is altogether of a milder type than that which is common in many other parts of India and especially in the almost adjacent districts of Lower Bengal where the swampy water-logged soil and the extremely humid atmosphere present climatic conditions widely removed from those of our higher and drier regions. The fact that so many cases are unclassified in itself suggests this, for it means that the fever yielded at once to treatment. Confirmation is to be had in the further fact, already referred to, that in many instances fever is not regarded by the people as a disease requiring treatment; in the fact that even in severe attacks a man many seem to be in his usual health and able for his usual work in the intervals; and in the comparative infrequency of spleen. I have several times, on laying my hand on the head of a child playing in the village street, been struck with the heat of its skin, and on taking its temperature have found it to be 102° or 103° ; yet the child would reply to my queries that it was in its usual health. It is to be noted, too, that the largest proportion of quartan cases occurred in May, when the proportion of fever cases was lowest, and that in August, November and December (the three worst months) they were below the average. Where quartan is so common, one would have expected to find the proportion of tertians higher, and my only explanation is that I may have more frequently failed to diagnose it. In addition to a number of the unclassified that would have proved to be tertian if left untreated, probably a portion of those classed as quotidian were double tertian, a type of fever which in the circumstances in which these observations were made it is very difficult and often impossible to distinguish from quotidian. Crombie* mentions Dinajpur and Maldah in Northern Bengal as two places where quartan is common, but I do not think these places in any way resemble this district.

It is to be borne in mind that in most of the statistics quoted,the proportion of quartan and tertian is their proportion to intermittents, while in my own figures it is the proportion to the total of fevers including remittent and continued. These latter have been few, and when I began this enquiry I did not think it necessary to classify them separately from the undefined. But independent and I think conclusive evidence of the prevalence of quartan fever in this district may be found in the existence of a name for it, in common use among the people, to distinguish it from other kinds of fever. They call it *tehar*, a word which I cannot find in any vernacular dictionary, nor have I heard of its being used elsewhere in India. They have also a term for tertian—*ekahi,* evidently from *ek* one (Hindi), but it is much less commonly used. I only discovered the latter word towards the end of the five years, while the former forced itself.

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* Presidential Address to the Calcutta Medical Society ; *Indian Medical Gazette*, March 1895.

upon my notice very soon after I had begun work, and while this may help to account to some extent for the less prominent place taken by tertian in the tables, I think it indicates that tertian is really much less common than quartan. *Bukhar, tap, jwar,* and *jara* are the common Hindi words in use for fever; *karris* is a local word belonging to the Kortha language of the uneducated villagers; among the Santals *rua*, the word for fever, is synonymous with illness generally.

Cholera.

Of Cholera only 36 cases or $\frac{1}{3}$ per cent. of the total were recorded—for cases which were dead before they reached the dispensary cannot be said to have been treated. Of these 23, nearly two thirds, occurred between April and June. Owing to the terrible rapidity with which this disease runs its course, only the cases which were in the near neighbourhood of the dispensary could be treated. Only once was there an outbreak in the mission and the adjoining village, in May 1891. Three school boys were attacked one morning of whom two were dead before night. Of these two, one had started for home on the onset of the symptoms and died on the road; the other became ill after going home for the midday interval and was in the stage of collapse before he was seen. The third, being a boarder, was put under treatment at once and recovered. The same day a coolie at work on the mission compound became ill and was carried home to his village to die the same evening. A fifth case occurred in the village, was treated early and recovered. Orders were issued that all cases of diarrhœa were to be reported without delay, with the result that during the next few days 14 cases were treated for choleraic diarrhœa of which some at least, had they been neglected, would probably have developed into typical cholera; but the symptoms being just those of severe diarrhœa, they were not classed as cholera. Only one more case of true cholera occurred, at that time. The cases treated at other times were sporadic; a few were pilgrims and other travellers who were brought in in a moribund condition. Only one other case occurred in the school or mission during the five years and it ended in recovery. The mission, therefore, and the Santal villages which surround it, may be said to have enjoyed a fair degree of immunity. Macnamara* gives a line drawn north from Juggernath or Puri to the Himalaya as the western boundary of the endemic area; this district lies just within that line, and severe outbreaks of cholera have occurred from time to time in Hindu villages within five or six miles of the mission. The Santals, however; seem to suffer less than their neighbours from cholera, and this I think is not to be attributed to their superior hygiene but to a very different cause. A Hindu village very often draws its supply of drinking water from a tank or pond which serves not only as the village bathing-place and washing-house but also as the public urinal and latrine. Bathing, being a religious ceremony, is religiously observed, however disastrous the consequences may be, and as the water sinks lower and lower as the hot weather advances the contents of the tank become filthy to an extreme degree. The Santals, on the other hand, are very careless regarding personal cleanliness, their toilet consisting not of washing off dirt but of smearing on oil. They very seldom bathe, hardly ever take the trouble of digging a tank, and draw their water supply from springs in the fields or from running streams. As a result they suffer much from skin disease but to a large extent escape cholera. Once when on tour I visited a village which contained a mixed population of Hindus, Kols and Santals, and found that a recent epidemic of cholera had carried off about twenty individuals in a few days. All the victims had been Hindus, the others escaping entirely, and I learned from inquiry that the Hindus, the wealthier section of the community to whom the village belonged, reserved for their own use a tank from which they took their drinking water, while the Santals and Kols supplied themselves from a spring in a field outside the village.

Influenza. Influenza occurred as an epidemic once, in April and May 1890, at Pokhuria. We heard of its having reached Bombay with the mail steamer and of its having crossed India to Calcutta without finding us out; but a man arrived from Calcutta with the characteristic symptoms which manifested themselves, within the few weeks that followed, among about half the school children. The few deaths that occurred were mostly from pneumonia following mild attacks. The natives could not remember having ever seen this disease before and called it the *belati bukhar* or "English fever."

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* Davidson, p. 400.

Measles. Measles is not common, but it is apt to be overlooked among a very dark-skinned race like the Santals, whose children so often suffer from fever with bronchial complications. The people, however, are aware of the disease, which they call *talsa.*

Rheumatism. Of rheumatism, the largest number of cases have occurred in June, when the onset of the rains causes a sudden fall in the temperature after extreme heat.

Syphilis. Syphilis accounted for only ·8 per cent. of the cases, 88 in all. The standard of morality among the people, although not high, is much higher than that of wealthier classes and of city populations. The exclusiveness of the Santals, the smallness of the village communities and the caste system which, with all its evils, at least places a check upon promiscuous sexual intercourse, may account for this. Further, all Indian towns are crowded with men from the villages,* who leave their wives at home, while in a district like this nearly all the men are living at home, and marriage is the rule.

Leprosy. Leprosy gave 159 cases, or 1·46 per cent. Many of these have been wandering beggars, for few cases exist in the neighbourhood. While I have no reason to believe this disease to be in any high degree contagious, for I have never seen it in man and wife, several instances in which both father and son have suffered from it, suggest that it is hereditary. While I have not seen any cases completely cured, I have known few cases of the earlier stages of the disease, that were not improved by the internal administration of arsenic.

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* Dr. W. J. Simpson states in his Health Report of Calcutta for 1891, that the proportion of men to women in that city was 211 to 100, and of children under 5 only 6 per cent. and of persons over 55 only 6 per cent. and 55 per cent. were strangers or persons not born in the town. *British Medical Journal*, February 18. 1893. p. 379.

Filarial disease.

Tuberculosis, except in the pulmonary form, is very rare, and of elephantiasis I have had only one case. Further, there is only one case (lymph scrotum) of that group of "elephantoid" diseases which, together with elephantiasis, Manson* associates with the *filaria sanguinis hominis nocturna*. The "white urine" which some patients complained of may in some cases have been chyluria, but in the cases in which I was able to examine the urine its whiteness was due to urates or pus, and in only one or two hydroceles has the fluid had a chylous appearance. The district is certainly very free from these diseases and it is also very free from the mosquito which seems to be the medium by which filarial disease is spread. Manson† describes Shertullay in Travancore, where, according to Waring, 1 in 21·3 of the population suffer from elephantiasis as "an ideal mosquito district. The yearly rainfall averages 100 inches; the land is low-lying, water-logged, swampy, and full of creeks." Here the climatic conditions are radically different and mosquitoes are so rare, comparatively, that it is only in the rainy season that mosquito curtains are nesessary at night. That elephantiasis scroti is very prevalent in regions much nearer than Travancore is evident from a remark by Fayrer that it prevails throughout Bengal and affects all races and ages‡; but in Lower Bengal the conditions resemble those of Shertullay. In the case of lymph scrotum I examined both lymph from the vesicles and a specimen of the blood treated with fuchsine for the filaria but without success.

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* Davidson, p. 775.

† Ibid p. 798.

‡ *Clinical Surgery in India*, p. 310.

Diabetes.

Although Bengal is said to be "the hot bed of diabetes" which is said, along with its sequelæ, to account for $^1/_{10}$th of the mortality of Calcutta,* only five cases have been seen in five years. *Eugenia Jambolana* (syn. *Syzygium Jambolanum)* is a common jungle tree in this district, and in two cases much good followed the administration of the powdered fruit stones in doses of 40-60 grains daily. In one case, that of a Santal, sugar which had been very abundant almost disappeared from his urine in a week, and the man increased in weight and felt so much better that he ran away by night without affording facilities for further observation. The other case was that of a Hindu whose urine was loaded with sugar and who was greatly emaciated and reduced in strength. He received 12 days' supply of medicine and returned two years afterwards to say that he had felt well and strong after taking the medicine but that the symptoms were beginning to manifest themselves again. His second visit was towards the end of 1894 and he has not been seen again. The results of treatment in the other cases are unknown. The tree has a wide reputation for medicinal properties in India, a decoction of the bark, which is astringent, being used in diarrhœa and dysentery and as a gargle, and a vinegar made from the fruit being taken as a carminative and for spleen etc.† A test for sugar common here but not mentioned in text books, is to expose the urine in an open vessel. If sugar is present it soon attracts a large number of ants.

Debility.

A considerable number of cases (210) are described as "starvation, old age, and general debility." These cases have been of a miscellaneous nature, but agreed in certain features. They represented the combined influences of extreme poverty, exposure and malarial poisoning, aggravated in some cases by old age. As a rule, they were anæmic, œdemic and bronchitic; the dropsy was sometimes extreme, demanding paracentesis abdominis, but physical examination did not detect any organic lesion of heart, liver or kidneys. Some of the cases resembled the descriptions given of beri-beri and anchylostomiasis, but a case for the diagnosis of either of these diseases never seemed to be complete, and the rapid improvement which has nearly always followed tonic treatment and feeding, with operative interference when necessary to relieve dropsy, has guided me in defining the cases under this general description. The cases marked specially by dropsy seemed to occur as small epidemics during the rains, and in many respects resembled the 'epidemic dropsy' described by Macleod.*

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† K. C. Bose, Paper read to Calcutta Medical Congress, *Indian Medical Gazette*, April 1895.

‡ Watt's *Dictionary of the Economic Products of India*, vol iii, p. 285.

Respiratory diseases.

Of diseases of special organs, Respiratory Diseases amounted to 7·12 per cent. of the cases. Of these bronchitis was the most common, equal to 6·73 per cent, and ranking fourth in the list of prevalent diseases in Table IV. It was most troublesome during the cold season, being above the average from October to February, June coming next, and May being most exempt. But in the case of more acute affections, catarrh and pneumonia, the maximum was reached in March. Many of these cases occurred in March 1891, when there were severe hailstorms with heavy rain. Rain early in the year finds the people unprepared; the thatch roofs have not been repaired, and once the rain finds an entrance the walls and floor become mud. The most frequent cause of the cases of phthisis I have seen has been neglected pneumonia following a wetting in the spring months. In the rainy season the people wear very little clothing, but in the cold nights early in the year they sleep wrapped up in what cloth they have although it may be wet. Phthisis, of which 74 cases were treated, can seldom be accounted for by occupation; but the want of space and of ventilation in their huts, in which a family of ten may live together in a single apartment of about 1500 cubic feet or even less, with no opening but the door, must have a prejudicial effect.

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* Dr. Kenneth Macleod. *Indian Medical Gazette*. 1893-94.

Diseases of vascular organs.

Diseases of the Vascular organs constituted 3·39 per cent. of the cases, the number being 369 and the most numerous class being enlargement of the spleen (146). These include only those cases in which the spleen could be distinctly felt beneath the ribs, and in some cases the organ reached to within two inches of the right iliac crest: yet such patients walked many miles to the dispensary and were able to take a surprisingly large amount of rice and dal at meal times. The internal treatment by quinine, arsenic and iron had to be relied upon in most cases, for the people never considered an enlarged spleen as sufficient ground for coming into hospital; but it was very satisfactory. A patient has complained that his spleen always enlarged as the cold season set in, but cases were about equally numerous in the hot and the cold seasons and fell off in the rains. Varix in a mild degree is not uncommon, but only two cases came for treatment. Of goitre only three cases were treated, while Maunsell* mentions that in Mymensingh in Bengal it amounts to 12 per cent. of the cases, and in other parts of India even to 57 per cent. Cardiac disease and anæmia did not reach 1 per cent.

Diseases of alimentary system.

The next class, Diseases of the Alimentary system, is a much larger one, containing 17·59 per cent. of all cases. Constipation and dyspepsia made up 9·24 per cent., more than half.

Dyspepsia.

It is surprising to find dyspepsia so rife among an uncivilised people who lead a very natural and often a very active life, and whose food is of the simplest description. Malarial poisoning may account for it to some extent, but it is very probably mainly due to the very poverty of the people. For months together, there may be no variety in their daily fare; periods of scarcity and hunger are followed by excessive indulgence in badly cooked food as one crop or another ripens; many jungle products, roots, barks, unripe fruits etc, form a constant item in the diet of the poorest; and putrid flesh of all kinds is freely eaten when it can be procured. Earth-eating is sometimes a confirmed habit among both children and adults. The heaviest meal is eaten at night, just before sleep, and six hours' work is often done in the morning without touching food. The small class of well-to-do are also troubled with dyspepsia from very different causes. They lead a very lazy life, almost never taking exercise, and indulge in a diet which, although not so highly nitrogenous as that common among Europeans in India, is very rich in saccharine and fatty elements and highly flavoured with condiments.

The number of cases among the natives in which the liver is congested and torpid is very small, a marked contrast to the condition common among Europeans. Habitual indulgence in alcohol although by no means unknown is not common and is chiefly confined to certain castes. I have attributed an extreme cases of ascites to cirrhotic liver in a *Sundi*, a caste whose trade it is to manufacture liquor. The largest number of cases of dyspepsia occurred in May, suggesting that climatic influence, especially heat, is a predisposing cause.

Diarrhœa and Dysentery.

The simple diarrhœa treated has been chiefly in the case of young children, in the hot weather. Dysentery and dysenteric diarrhœa have been classed together, because it has been very difficult in many cases to distinguish between them. True dysentery, I believe, is rare here. What the natives call *sul*, muco-purulent diarrhœa, is often classed as dysentery, and there are other cases in which there is a fairly free discharge of blood from the bowel without straining; but I have never seen a case which ended in perforation, nor have I ever diagnosed abscess of the liver, which is said to occur in 20 per cent. of dysentery cases in the European hospitals in Calcutta. But Cayley, who gives this figure, states that while liver disease is very rare among natives dysentery is as common as among Europeans.* The late Surgeon Parke† described a *gastro-intestinal catarrh* which he was often called upon to treat in Africa, as resembling dysentery and often mistaken for it, but differing from it in having little tenesmus and no ulceration, the large intestine being less involved. Most of the cases recorded here have been of this type and have not responded as a rule to ipecacuanha. Castor oil and laudanum or bismuth in the early stages, with careful dieting, have been much more useful. This form of diarrhœa has been more frequent than the simple, or more cases have been treated because it was more alarming; and it reached its maximum, not in May, but in August. The cases of prolapse of rectum or anus have been in young children (under 10) with a history of chronic dysenteric diarrhœa.

The very small number of cases of worms has been already referred to. The melæna, hæmorrhage from lower bowel, hæmatemises and bleeding gums have existed by themselves without symptoms of organic lesions or constitutional disease. In this country the mucous membranes seem liable to hæmorrhage.

Toothache.

Toothache, like dyspepsia, is commoner than might have been expected. The largest number of teeth were extracted in September because at that time the people live largely on Indian corn, the hard grains of which detect any decay in the teeth. A number of teeth were extracted, not because they were themselves decayed, but because the lime which the Santals always mix with the tobacco they chew, had formed concretions round them and loosened them from their sockets in which suppuration set in, leading often to an abscess pointing externally and a subsequent sinus.

Nervous Diseases.

The cases of Nervous Disease, formimg 5·54 per cent. do not call for much comment. Headache is probably due to fever in most cases, and must often be a distressing symptom, for the drastic remedy of applying a red-hot toothed sickle to the forehead is in common use. It was most frequent in September probably as a sequela of the fever of August. March comes next, then May, so the heat of the sun cannot be said to have a marked effect.

Paralysis. The cases of paralysis included hemiplegia (12 cases), paraplegia (2 cases), facial paralysis, infantile paralysis, paralysis agitans (one case in a man operated on for cataract), and one case of pseudo-hypertrophic muscular paralysis. The Santals have a term for a hemiplegic, whom they call a *mit' kar goc' hor*, a "one-side-dead-man," but have no expression for paraplegia. Lumbago etc. were most common in March, July, October and September, not the cold months but the months of change.

enito-urinary iseases. Under Genito-Urinary Diseases (5·65 per cent.) the most frequent was burning urine, with 221 cases. A much greater number came complaining of this but were treated for fever. The two sources of this ailment were fever and working in the sun in the hot weather, and the majority of the cases recorded separately belonged to the latter class. The urine naturally becomes more concentrated and higher in colour in the hot weather, and in those who perspire profusely by hard work this condition is exaggerated. The cases were most frequent in May and the earlier part of June, and fewer during the rains than at any other season. A complaint less frequently made was that the urine was "white," either white when passed (due in some cases examined to pus) or leaving a white deposit when it dried on the ground, due to urates. The cases recorded simply as "white urine" are those in which no examination was made and may have contained cases of chyluria.

Hydrocele. Hydrocele comes next with 162 cases. Tapping was the only treatment possible in most cases, for few consented to remain under treatment. Fayrer says that "hydrocele as it occurs in Bengal may generally be considered as an early symptom of incipient elephantiasis*," but were this true of this part of Bengal, surely some cases of elephantiasis would have been seen among or along with 162 cases of hydrocele, many of them of considerable size (containing 2 pints of fluid) and old standing.

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* *Clinical and Pathological Observations in India*, p, 515.

Impotence.

27 cases are described as impotence, but if all who came complaining of this symptom were included the number would be very large. One of the very common complaints made especially by the Hindus who regard procreation as a sacred duty and the absence of male issue as little else than a curse with eternal consequences, is *dhat bigar gaya* (" my seminal fluid has gone bad.") They do not always complain of loss of sexual power but that their semen is deficient in quantity or consistency, that it is watery (*patla*). Native quack doctors advertise drugs " that will increase the quantity and consistency of the seminal fluid" and so cure sterility. Many of the people are on this subject extremely morbid and few things distress a Hindu so much as the threatened loss of sexual power in himself or in his sons. Early marriage and incontinence often do lead to premature decay, helping to explain the fact that the chief trade done by the native practitioners is in aphrodisiacs* Many of those who made this complaint were found to be suffering from chronic fever or anæmia.

Calculus.

Calculus, which is so common in many parts of India, is rare here. Of the 6 cases, one was urethral where a phosphatic stone, measuring 3¼ inches from tip to tip and the same at its greatest circumference, and weighing 150 grains, was found pointing at the meatus, and was removed by enlarging the opening freely under chloroform. The patient, a Santal, said the stone had been *in situ* for three years. The other cases were vesical, and the only two who were willing to be operated on were sent to the nearest hospital.

Female disorders.

The cases of menstrual disorder were few, leucorrhœa in middle-aged women being the most frequent. The small extent of obstetric work has been referred to already. One curious fact in connection with lactation is that one child is nursed as a rule until another child is born, and the youngest child sometimes continues to suck till the age of nineorten.

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* *Statistical Account of Bengal* (Sir W. W. Hunter). *vol* xv *(Monghyr)* p. 198.

This probably explains the fact that large families are rare. I do not know of any in the neighbourhood in which there are more than six children. As one woman very seldom nurses another woman's child, there is a high mortality among infants whose mothers have died. A goat is sometimes made to fill the mother's place, or the child sucks a piece of rag dipped in milk; the feeding-bottle is an innovation which has become very popular among those who are able to afford it.

Skin diseases.

Scabies.

Skin Disease constituted 21·72 per cent. of the cases and owed its bad pre-eminence to scabies, of which 1971 cases were treated, 18·14 per cent. of the total. This disease is the scourge of this part of India, causing more pain and misery than any other disease. Being regarded as practically incurable, it is neglected and becomes in many cases a terrible disease, causing more positive suffering than leprosy, and equally incapacitating the victim for all the duties and pleasures of life. Next to the hands, the nates, crutch and inner aspect of the thighs are most frequently attacked, making it impossible for the patient either to sit with comfort or to stand erect. The accumulation of scabs leads to the formation of ulcers and abscesses and in one case I have found several sinuses in the thigh, filled with maggots. Very often the patients may be seen crawling about with the help of a stick as if their lower limbs were paralysed, covered with sores from head to foot; even in mild cases a straddling gait makes a case recognisable from a considerable distance. The sufferers become completely demoralised and miserable in the extreme. As the sores prevent them from moving their fingers without pain, their inability to eat their food (always eaten with the fingers) is added to their other discomforts. Grown up persons have often to be fed like children, and others may fix a shell between their fingers—as I have seen a leper fixing it between his stumps—to serve as a spoon. It is seldom found as isolated cases, for when a family sleeps huddled up together in a hut, the disease spreads from one to another with great rapidity, and no one escapes. Although worst among the poorest it is not confined to any class, and all ages and both sexes suffer. Season has a very marked effect on this disease. It is worst in the cold weather, declines steadily during the hot months, and reaches its lowest point in June at the breaking of the rains. Then it steadily increases again till it reaches its maximum (relatively) in November. The obvious explanation is that the people do not wash or bathe during the cold season, except religious Hindus and the well-to-do among the other classes. There are many who probably never wash themselves, but the thorough drenching they get at the onset of the rainy season seems to give them a temporary respite. Not the hottest months (April and May), but the wettest (June and July) are the months when the figures reach their lowest. The people generally admit that regular washing is a prophylactic, but in the cold weather it is not so easy for them to bathe as one who is unaware of their terrible poverty might suppose. The bathing is done in public, in a tank or river, so the women bathe wearing the one piece of cloth (*sari*) which forms their costume. In the hot season they do not object to have their wet saris hanging about them till they dry, and the heat dries them quickly, but in the cold weather this would cause much more discomfort and even danger. To a woman who possesses only one piece of cloth in the world, the problem of keeping both it and herself clean is a difficult one.

The figures found in the table give a very inadequate idea of the prevalence of scabies throughout this district. In touring in the cold season through crowded districts I often number the patients suffering from this one disease by the hundred every day; and the numbers have increased steadily year by year until last year ('94) the total for whom sulphur was dispensed in camp must have reached 4,000. The treatment by sulphur ointment when it can be carried out properly is most satisfactory. I have taken a case into hospital just to observe the effect and give my assistants a demonstration of the method, and the change effected by a scrubbing with warm water followed by the free inunction of the ointment from head to foot daily for three days, has seemed, to those who had never witnessed it before, little short of miraculous.

Ringworm.

Ringworm is very common, but few persons regard it otherwise than as a trifle not worth taking any trouble about. It is nearly always ringworn of the body. I have only noted one case of ringworm of the head and one of the beard among the 187 treated. The common practice of shaving the heads of children—the domestic remedy for phtheiriasis and a very effective one,—and the absence among the poorer of any head-dress, may account for this. The part most often involved is the waist, the only part where clothing is worn pretty constantly. The reverse of the rule regarding the seasonal prevalence of scabies holds good in the case of ringworm, the rainy months being the worst. Of 187 cases, 143 were in the months June to October. The disease exists at all times, but causes irritation and tends to spread chiefly in the rains. It seems to be the rule that it is generally more troublesome in climates that are both hot and moist*, as our climate is in the rains.

The other skin diseases, besides eczema and psoriasis, were impetigo, pemphigus, leucoderma, urticaria, herpes, boils, pruritus, pityriasis and fissures of the feet, amounting to 86 in all.

Diseases of osseous structures.

Among diseases of osseous structures the only numerous class is that entitled "pain and stiffness of the joints" These are probably the kind of cases often described as "chronic rheumatism," pain aggravated by movement in one or two joints, chiefly the knee, shoulder and elbow, without any evidence of inflammation or history of injury; but I 'have not felt justified in describing them as rheumatic simply because no other explanation could be given. Fractures and dislocations are rare, for the occupations of the people do not expose them to violent injury. Most cases that did occur were due to falling from trees and in one case there was a fracture of the humerus with compound fracture of the femur, a case which made a fairly good recovery in spite of the refusal of the patient's friends to leave him with me for treatment after the splints were applied.

The "burning sensation in the feet" is found chiefly in debilitated subjects, mainly due, I think, to a sluggish circulation.

Eye diseases.

Cataract.

Eye Diseases were 983 in number, or 9·04 per cent. Cataract was the most common, but of the 306 cases seen only 88 were found to be both ready and willing for operation. In 87 the modified linear operation was performed, with iridectomy in nearly all the cases. In one case pricking was done, but the patient did not return to have it repeated. The results were: 59 were put down as satisfactory, the patients regaining vision sufficiently good to enable them to go about their work as usual. The work has been in most cases agricultural, but I know of one patient, operated on three years ago, who has since then been engaged in weaving cloth, while another sees well enough to perform the duties of village night-watchman. 7 were complete failures; in 2 of these I failed to extract the lens or only extracted a fragment of it; 2 ran away a day or two after the operation, of whom one returned many months afterwards with an empty socket, and of the other I was told although I did not see him again that he was as blind as he had formerly been; in 1 case a very soft lens was extracted and the wound healed, leaving a clear pupil, but there was no improvement in vision; in 1 case iritis set in and the pupil was occluded by adhesion; and in the remaining case an escape of vitreous took place at the time of operation, followed by hæmorrhage afterwards. Then 15 cases were partially successful, the vision being imperfect, the ability to count fingers being the test of admittance to this class; in two of these cases the imperfection was apparently due to secondary capsular cataract, but the patients were so well satisfied with the result that they refused to return for another operafor the patients ran away a few days after the operation and were not seen or heard of again. It is possible that some of these six turned out well, for in at least one case a woman who ran away with the corneal wound unhealed and a slight protrusion of the iris returned in a few weeks with the wound healed and good vision. It would be impolitic for many reasons to detain patients in hospital here against their will, and the mental worry and fretfulness would probably counterbalance the advantages of correct treatment. However insanitary and septic the homes of the people may be, they seem to favour the healing process better than a hospital ward in which the patient is detained against his will.

Most of these operations have been done under difficulties arising partly from the want of hospital accommodation during most of the time, and partly from the impossibility of securing the intelligent co-operation of the patients and their friends in carrying out the subsequent treatment. The majority of the cases were accommodated in mud huts, in schoolrooms, or in verandahs, and it was seldom found possible to keep them under treatment beyond ten days. Fortunately a case that is doing well is usually healed within that time. I do not think any one of the 88 had ever learned to read, so testing by types was not possible.

Conjunctivitis

Next to cataract, conjunctivitis was most frequently seen, chiefly among children. Most were catarrhal; a few granular and purulent. The influence of season was very distinct, for 74 out of 271 cases were in June and 55 in July. I once suffered myself from a mild attack, in July 1890. The disease almost disappeared in the cold months, and although more common in the hot months was not by any means most prevalent then as appears to be the rule elsewhere in Monghyr. * Drake-Brockman states † that in Madras catarrhal ophthalmia is epidemic at changes of the season—at the setting-in of the N. E. and S. W. monsoons.

Here the N. E. monsoon is hardly perceptible, but the influence of the S. W. monsoon which "breaks" in June is very distinct.

Keratitis etc.

Under keratitis, which is also most prevalent in the rains, are included the group of serious lesions of which it is usually the starting point—corneal ulcer, onyx, hypopyon, staphyloma, prolapse of iris and uveitis; opacity of the cornea has been classed separately as a chronic affection. I have performed several iridectomies to form an artificial pupil. Night blindness is exceedingly common, often existing in those who are otherwise healthy, as a life long defect. Only a fraction of the sufferers apply for treatment, as it is generally regarded as a natural condition, an idiosyncrasy rather than a disease. The treatment adopted, in addition to tonics, has been to bandage one eye and instruct the patient to keep it bandaged by day for a week or two, and then to treat the other eye in the same way. But I have never known any one to persevere with this treatment long enough to give it a fair trial; the remedy is considered worse than the disease and as a man's work as a rule ends with the daylight the inconvenience he suffers is not serious. The affection is most common in the very hot weather in May and the beginning of June. It is an instance of the vastly different climatic conditions to be met with in India that as I write (April) people in one part are being blinded by the glare of the sun and our soldiers on the frontier are being invalided from snow-blindness and frost-bite.

Night blindness.

Among the cases of total blindness are a number of cataract cases which have been treated by native doctors. The old "couching" operation is performed, but although vision may be restored temporarily the presence of the lens in the posterior chamber seems to lead in most cases, sooner or later, to total and incurable loss of sight.

Most of the cases of glaucoma were too far advanced when

Panophthalmitis. The one case of panophthalmitis illustrated the rapidity with which a destructive disease of the eye may run its course. A child was brought with its eyelids closed and greatly swollen—a condition, the friends said, that had existed only for a few days. When I proceeded to the preliminary step of washing the eyes with an antiseptic lotion, on very slight pressure the whole contents of one eye gushed out as a putrid stream, in which the crystalline lens was the only recognisable structure.

Nose and Ear. Among Diseases of Nose and Ear, otorrhœa was the most common. In touring I have come to regard the frequency of otorrhœa and spleen as indications of a specially unhealthy district. The foreign bodies extracted from nose and ear have been cowrie shells, fruit-stones, beans etc, which children have inserted when playing.

Among miscellaneous diseases ulcers and absceses were the most numerous. Season seems to have had an influence even on these, for the greatest number of ulcers were in June and of abscesses in March—two months which have been seen to affect some other diseases very markedly.

Cicatrisation. The one case of deformity from cicatrisation represents the only example of a very common condition upon which I operated. The cicatrix is usually the result of an extensive burn, the young children often falling into the open, unprotected fires when their mothers are working in the fields. The cicatricial tissue often forms a web binding the arm to the side or permanently flexing the elbow or knee. As the operation of dissecting away a large cicatrix is a serious one the people are unwilling to submit to it, nor is a surgeon who is not well furnished with hospital appliances in a position to undertake it. This one case was that of a young child whose fingers had become webbed together; but the child was removed the day after operation and not seen again. Once when on tour I saw into the fire during an epileptic fit, and whose hand (the left) had become flexed flat upon the forearm during the healing process, and firmly fixed there, with fingers pointing towards the elbow, giving the forearm the appearance of having been amputated at the wrist.

Wounds.

The wounds treated have not as a rule been serious. Steam machinery is unknown and things generally move too slowly to cause danger to life or limb. A man occasionally cuts himself with the hatchet or adze with which he is cutting fire wood, and a girl is apt to have a finger crushed by a machine called the *dhinki* for husking rice. This a heavy piece of timber fixed on a pivot and worked as a lever by treading one end of it, while at the other end a projection capped with iron pounds the rice in a hole in the ground. One of the household duties which the girl first learns is to keep sweeping the rice into this hole as it is being pounded, and if she is not careful and active her fingers are apt to be injured. In one case a Santal's hand was partly shattered (thumb and index finger blown away) by the explosion of a gun.

Injuries by animals.

The injuries by animals have consisted of 7 scorpion bites—exceedingly painful,—and 2 snake bites; 1 kick by a horse, splitting the upper lip; 1 case gored by a buffalo; 1 jackal bite and 1 dog bite; 2 injuries by bears—one a simple flesh wound in the buttock, the other a very extensive injury to the knee inflicted in hunting when the bear was at bay; and 1 case mauled by a leopard, bitten in the right shoulder and scratched by claws over back and thigh. In all the cases of injury by wild animals, it may be added, the patients were saved from further harm by their companions who were armed simply with sticks. Of the two cases of snake bite both were doubtful. In one case I could find no trace of the bite although the story was clear; in the other there was slight swelling but no abrasion; both recovered. It is surprising that there are not more snake-bites, for both cobras and kraits, the most deadly species,* are common throughout the district, and I have found cobras more than once in my bedroom in the morning. In the rains they are driven from their holes in the jungle and often take refuge in the houses—in a bath-room which they enter through the escape-pipe or in the thatch roof of native huts. Sleeping on the ground, walking barefooted through long grass and travelling at night without a light, are said to be the common causes which expose natives to snake bite—and about 20,000 deaths are reported every year*—and all three practices are very general here; yet not only have I seen no death but no clear evidence of a bite, poisonous or innocent.

Burns have already been referred to. They have been chiefly in children, but three lads were extensively burned by the explosion of gunpowder which they were drying before the fire.

Tumours

Of the tumours 6 were malignant and 2 ovarian, for which nothing could be done. The rest were for the most part fatty or cystic; but only the smaller were removed.

Other diseases

A few diseases of which no examples are contained in the dispensary lists up to February 13th were seen on tour, among them one case of cretinism and one of ainhum, and since that date there have been two epidemics in the district of diseases not previously seen—mumps and chicken-pox. 8 additional cataract operations have been performed, 2 pricking operations which have not yet been repeated, and 6 extactions of which 4 were successful, 1 partially successful and 1 a failure.

Diseases not seen or rare.

The list of diseases which has been given is perhaps more interesting on account of what it does not contain than on account of what it does contain. Of diseases common in other countries which I have not seen, smallpox, scarlet-fever, diphtheria, rickets, enteric fever, may be mentioned; and of "diseases of India"

I have seen neither beri-beri, anchylostomiasis, mycetoma, nor sunstroke. Of goitre, elephantiasis, diabetes, calculus, diseases very common in many parts of India not remote from this district, I have seen only a very few cases.

Smallpox and vaccination.

The absence of smallpox is very striking and interesting, for that it was within the present generation a very prevalent disease the large number of pock-pitted men and women who are everywhere met with clearly testifies. Inoculation was practised very largely till it was made illegal by the Government of of India; but vaccination has thoroughly gained the confidence of the people. *Tika* is the term for inoculation, and vaccination is often called *Angrezi* (English) *tika*, to distinguish it from the old system. Among a people who are extremely conservative, who in all their social life and daily work adhere so persistently to their ancestral ways and follow ancient methods of agriculture however laborious they may be, it is remarkable to find not only no prejudice against vaccination but a unanimous public sentiment in its favour. It must be remembered, too, that vaccination is not compulsory and that the fees which the Government vaccinators charge (two annas or twopence per child, equal to the daily wage of a working man) are a very considerable tax upon the poor. Yet vaccination is hardly ever evaded, and never willingly, I believe. Recently when an outbreak of chicken-pox among the school children and the presence of smallpox in epidemic form in Calcutta and elsewhere led me to re-vaccinate, I found that of 153 Santal boys and girls in the mission school, varying in age from 6 to 16 years, only one girl clearly never had been vaccinated and in one boy it was doubtful.

Once when on tour I met a young woman who was recovering from an attack of smallpox, the white marks left by the pustules showing very plainly on her dark skin, and I once visited a village where I was told there had been an outbreak whose eyesight had been destroyed by it; and that is my entire experience of smallpox during these five years, among 10,000 patients at the dispensary and 14,000 in camp. This immunity cannot, in my opinion, be attributed to anything but vaccination. Sanitation, in our sense of the term, simply does not exist and never did; if anything, the sanitary or insanitary condition of the villages to-day is worse than it formerly was, owing to the increase of population.

Diversity of climatic conditions etc. in India.

The comparative rarity of goitre, elephantiasis, and calculus, the moderate degree of splenic disorder, and the large number proportionally of fevers of the quartan type and many other striking differences between the statistics of medical work here and medical work elsewhere, prove that it is as difficult to make general statements about "the diseases of India" as it is to make sweeping assertions about anything else connected with the empire. India, it has been said, is not a country but a continent; greater differences exist between different parts of it than between the various countries of Europe; it possesses no sort of unity, physical political, social or religious.* In a country where almost every degree of atmospheric temperature may be experienced, where one place like Sind is as rainless as Egypt, while another, like Cherrapunji, has an average rainfall of 500 to 600 inches, the highest in the world, there is the greatest possible variety of climatic conditions. Nor are the places which differ so widely in climate always very remote from each other geographically; while Poona, for instance, has a rainfall of 26 inches, on the face of the hills 40 miles to the west, the fall is 250 inches. Speaking not of the climate but the climates of India, Blanford says "the world itself affords no greater contrast than is to be met with at one and the same time, within its limits." † One of these contrasts is between our high and dry tableland of Chota Nagpur and Southern Behar and the alluvial tracts of Lower

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* Sir John Strachey's *India*, ch. I. p 5. (Edition of 1894)

† Quoted by Strachey, p. 17

Bengal lying between us and the Bay of Bengal, and I think the figures I have given demonstrate the existence of a difference in the diseases prevalent as great as that in the climates.

General conclusions.

For this district it seems to be clear from these tables that the climatic conditions unfavourable to health are not those either of the hot season or of the cold season, but of the seasons of change and of the rains with their rapid alternations of temperature and humidity. March, June and the autumn months are the times when sickness is most rife, and fever is of a specially severe type in August. February, April, and May are the healthiest, the rice harvest explaining the low figures from November to January.

On the whole, it may be claimed for this district that the health conditions are, for a tropical country, not unfavourable and the public health fairly good. For scabies, the most prevalent disorder, the people and not the country are responsible; fever is not so general or at least not so severe, as in neighbouring districts, and would be much less common if the people were better fed, better clothed and better housed. Most of the diseases in fact, certainly the most prevalent,—scabies, fever, dyspepsia and bronchitis,—are diseases of poverty. Cataract and conjunctivitis are probably less subject to social conditions. For natives who can afford a very moderate degree of comfort,—a water-tight hut with tiles instead of thatch, a pennyworth of rice and dal daily and a few yards of cotton cloth with a blanket for the cold season,—and who have the good sense to drink only pure water and to eat clean food, there are probably as few dangers to life here as there are to the poor at home. To the poor who are in a chronic condition of hunger and nakedness, life is hard here, but it would be impossible in Scotland.

Death-rate.

It would be interesting to know the death-rate among these villagers, but it is very difficult to obtain reliable statistics. Among the small native Christian community at Chakai

I find that the death-rate for the three years 1892-93-94 averaged 17·85 per 1000 per annum and the birth-rate 64·28 per 1000; but the numbers (76 in' 92, 98 in' 93 and 106 in' 94) are too small to justify the drawing of any general conclusions. Probably the death rate is lower among the Christians than among any other class of the community because they are better supplied with medical relief and more eager to take advantage of it. In the Government returns for 1893 the highest death-rate quoted is that of Berar (Central Provinces), where it was 32·6 and the lowest is that of Mysore, 15·79.

Table I.—*Analysis of Patients according to Religion and Sex.*

Religion or Race.		Men.	Women.	Children.	Total.	Percentage of Total.
Hindus and Semi-Hinduised Aborigines	...	5041	1160	1668	7869	=72·42°/。
Percentage of Hindus, &c.	...	=64·06	=14·74	=28·18		
Mohammedans	...	356	97	99	552	= 5·08°/。
Percentage of Mohammedans	...	=64·49	=17·57	=17·93		
Santals and Kols (Aborigines)	...	752	345	476	1573	=14·47°/。
Percentage of Santals, &c.	...	=47·80	21·93	30·26		
Native Christians	...	247	189	435	871	=8·01°/。
Percentage of Christians	...	=28·35	21·69	=49·94		
Total	...	6396	1791	2678	10865	
Percentage	...	=58·86%	=16·48%	=24·64%		

Table II.—*Analysis according to months of year, with percentage of total number treated each month.*

Total No. =11107, Monthly average 925·58.

Month.		Number.	Percentage.	Month.		Number.	Percentage.
January	...	747	6·72	July	...	763	6·86
February	...	782	7·04	August	...	904	8·13
March	...	1039	9·35	September	...	1066	9·59
April	...	907	8·16	October	...	1492	13·43
May	...	953	8·58	November	...	916	8·24
June	...	1007	9·06	December	...	531	4·78

Table III.—*Analysis of Diseases with percentages, arranged according to months.*

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	Percentage.
I GENERAL DISEASES.														
Malarial Fevers ...	113	91	171	134	83	118	109	196	161	229	162	79	1,646	15·14
Cholera ...	0	1	2	7	8	8	3	4	2	1	0	0	36	·33
Influenza ...	0	0	1	68	45	2	6	3	0	0	0	0	125	1·15
Measles ...	0	0	0	0	0	0	6	4	0	0	0	0	10	·09
Rheumatism ...	9	4	11	2	13	15	10	12	9	20	9	3	117	1·07
Syphilis ...	6	5	9	5	7	6	6	8	13	12	7	4	88	·80
Leprosy ...	12	7	15	26	20	24	7	7	15	11	9	6	159	1·46
Tuberculosis ...	0	0	0	0	2	0	0	0	1	0	1	0	4	·03
Elephantiasis ...	0	0	0	0	0	0	0	0	0	1	0	0	1	0
Diabetes Mellitus ...	0	0	1	1	0	0	0	0	1	1	1	0	5	·04
Starvation, Old age and General Debility ...	18	21	19	11	18	10	19	18	23	28	18	7	210	1·93
Obesity ...	0	0	0	0	1	0	0	0	0	0	0	0	1	0
II DISEASES OF RESPIRATORY ORGANS.														
Catarrh ...	19	12	40	10	20	12	9	14	25	15	3	5	184	1·69
Sore Throat ...	1	0	2	1	1	3	0	1	2	0	0	0	11	·10
Asthma ...	7	8	3	0	4	4	5	5	2	11	3	1	53	·48
Bronchitis ...	47	42	34	19	14	41	22	18	29	68	38	26	398	3·66
Pneumonia ...	1	0	22	1	3	2	3	2	2	2	1	1	40	·36
Phthisis Pulmonalis ...	5	6	8	4	6	8	9	5	7	10	3	3	74	·68
Pleurisy ...	0	0	2	0	1	3	2	1	2	2	1	0	14	·12
Total ...													774	7·12

III DISEASES OF VASCULAR ORGANS.														
Cardiac ...	6	8	10	11	10	11	8	6	18	10	3	2	103	·95
Enlargement of Spleen ...	11	5	16	15	16	8	8	9	9	31	11	7	146	1·34
Varix ...	0	0	0	1	1	0	0	0	0	0	0	0	2	·01
Disease of Lymphatic Glands ...	0	1	2	0	2	1	0	3	2	2	0	0	13	·11
Anœmia ...	10	2	13	4	5	10	7	10	11	18	9	3	102	·93
Goitre ...	1	1	0	0	0	0	0	0	0	1	0	0	3	·02
Total ...													369	3·39
IV DISEASES OF ALIMENTARY TRACT.														
Toothache ...	7	9	18	29	22	20	13	14	37	34	5	6	214	1·96
Gumboil, Thrush, Bleeding gums, Loosening of Teeth, Scarcity of saliva ...	1	5	5	2	1	3	2	2	5	0	1	0	27	·24
Congenital Cleft Palate ...	0	0	0	0	0	1	0	0	0	0	0	0	1	0
Tonsillitis ...	2	0	0	0	0	0	0	0	0	0	1	0	3	·02
Dyspepsia and Constipation ...	77	63	76	82	85	114	70	91	108	142	62	34	1,004	9·24
Diarrhœa ...	5	8	20	20	45	20	30	21	20	15	2	7	213	1·96
Dysentery and Dysenteric Diarrhœa ...	10	10	19	21	28	26	28	47	27	29	12	5	262	2·41
Worms ...	0	1	2	0	0	3	3	2	1	1	1	0	14	·12
Melæna and Hæmorrhage from Bowel ...	1	1	6	1	1	1	0	2	2	1	0	0	16	·14
Piles ...	6	5	7	1	1	6	3	3	2	5	6	0	45	·41
Disorders of Liver, Cirrhosis, Jaundice &c. ...	1	1	4	5	3	2	3	0	2	3	0	0	24	·22
Hernia of bowel ...	3	6	5	4	1	7	1	0	3	2	2	1	35	·32
Ascites ...	3	1	1	1	1	2	0	3	3	1	0	1	17	·15
Anorexia ...	0	1	1	1	1	0	0	0	0	0	0	0	4	·03
Gastric ulcer ...	0	0	0	0	0	0	0	0	0	0	2	0	2	·01
Prolapse of bowel or anus ...	4	0	1	4	3	2	1	0	3	1	0	1	20	·18
Fistula in ano ...	0	0	0	0	0	0	0	0	0	0	1	0	1	0
Phthisis enterica ...	0	1	0	0	0	0	0	0	0	0	0	0	1	0
Discharge of white matter ...	0	0	1	0	0	0	0	0	0	0	0	0	1	0
Hæmatemises ...	0	2	0	1	0	0	0	2	1	2	0	0	8	·07
Total														

Table III.—*Analysis of Diseases with percentages, arranged according to months.*—(Contd.)

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	Percentage.
V DISEASES OF NERVOUS SYSTEM.														
Headache ...	8	9	23	9	17	7	12	15	37	9	9	6	161	1·48
Epilepsy ...	6	7	8	4	4	4	4	7	6	17	6	6	79	·72
Convulsions ...	0	0	1	0	1	0	0	2	0	1	0	0	5	·04
Aphasia ...	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Locomotor ataxy ...	0	0	0	1	0	1	0	0	0	0	0	0	2	·01
Chorea ...	0	0	0	0	1	0	0	0	0	1	0	0	2	·01
Paralysis ...	1	5	5	6	2	7	3	3	4	12	2	0	50	·45
Insanity ...	0	0	0	1	1	1	1	0	5	2	1	0	12	·11
Lumbago, Sciatica and Neuralgia ...	17	19	36	20	23	26	27	25	32	46	17	5	293	2·69
Total ...													605	5·56
VI DISEASES OF GENITO-URINARY SYSTEM.														
Hydrocele ...	9	13	12	12	21	19	17	8	12	24	8	7	162	1·49
Stricture ...	0	2	0	0	1	0	0	0	0	1	0	0	4	·03
Gonorrhœa ...	2	4	4	8	5	8	7	3	3	1	3	2	50	·46
Chancre ...	2	2	1	6	5	1	5	4	8	4	4	3	45	·41
Bubo ...	0	0	0	0	0	0	0	0	0	0	0	1	1	0
Phimosis, Paraphimosis anb Balanitis ...	0	2	2	0	2	2	1	1	2	3	0	0	15	·13
Calculus ...	0	1	1	1	1	0	0	2	0	0	0	0	6	·05
Bright's Disease ...	0	1	1	0	1	2	0	1	0	2	1	0	9	·08
Cystitis ...	0	0	1	0	0	0	0	0	0	2	0	0	3	·02

Hæmaturia ...	0	0	0	0	0	1	0	0	0	0	0	0	1	0
"Burning urine" ...	17	18	16	24	35	33	8	15	16	16	17	6	221	2·03
"Urine white" ...	0	0	3	0	2	1	0	0	0	1	0	0	7	·06
Incontinence of urine ...	0	0	0	0	3	1	2	1	2	0	0	0	9	·08
Diabetes Insipidus ...	0	1	0	0	0	0	0	0	1	0	0	0	2	·01
Impotence etc ...	5	0	1	2	5	4	4	0	4	0	1	1	27	·24
Enlarged prostate ...	0	0	1	0	1	1	0	0	0	0	0	0	3	·02
Orchitis ...	1	1	2	0	0	4	0	0	0	0	0	0	8	·07
Lymph Scrotum ...	0	0	0	0	0	0	0	1	0	0	0	0	1	0
Prolapse of Uterus ...	0	0	0	1	0	0	0	0	0	0	0	0	1	0
Leucorrhœa ...	2	4	3	1	0	0	1	4	4	2	3	0	24	·22
Amenorrhœa ...	0	0	0	1	0	0	0	0	0	0	0	0	1	0
Menorrhagia ...	0	0	3	1	0	2	0	0	0	0	0	0	6	.05
Vaginitis ...	0	0	0	0	0	0	0	0	0	1	0	0	1	0
Parturition and Lactation.														
Inflammation of Breasts and Milk abscess ...	0	0	1	0	0	0	1	0	0	0	0	0	2	·01
Agalactia ...	0	1	0	0	0	0	0	0	0	0	0	0	1	0
Puerperal Fever ...	0	0	1	0	1	0	0	0	0	0	0	0	2	·01
Post-partum hæmorrhage ...	0	0	0	0	0	0	0	0	0	1	0	0	1	0
Debility after child birth ...	0	0	1	0	0	0	0	0	0	0	0	0	1	0
Total ...													614	5·65
VII SKIN DISEASES.														
Scabies ...	173	223	157	135	123	73	68	102	176	386	250	105	1971	18·14
Eczema ...	5	7	13	14	12	14	8	8	9	5	2	2	99	·91
Ringworm ...	11	3	5	9	8	32	17	29	35	30	6	2	187	1·72
Psoriasis ...	2	1	1	0	3	2	1	0	1	4	1	1	17	·15
Other Skin Diseases ...	5	3	15	4	9	13	6	11	8	9	3	0	86	79
Total ...													2360	21·72

Table III.—*Analysis of Diseases with percentages, arranged according to months.*—(Contd.)

	January.	February.	March	April	May	June.	July.	August.	September.	October.	November.	December.	Total.	Percentage.
VIII DISEASES OF BONES, AND OF ORGANS OF LOCOMOTION.														
Necrosis and Spinal Curvature ...	0	1	1	0	0	3	1	2	0	4	1	0	13	·12
Periostitis ...	1	1	0	0	0	0	1	1	1	3	2	0	10	·09
Hydrocephalus ...	0	0	0	0	0	0	0	0	0	0	1	0	1	0
Fractures ...	0	0	1	1	0	1	0	1	0	0	0	0	4	·03
Dislocations ...	1	0	0	0	0	0	1	1	1	0	0	0	4	·03
Sprains ...	1	0	2	5	2	2	1	1	0	1	0	0	15	·13
Nostolgia ...	0	2	0	0	0	1	1	0	0	0	0	0	4	·03
Synovitis &c ...	0	2	1	1	0	1	2	2	2	3	2	0	16	·14
Pain and Stiffness of Joints ...	11	16	16	8	11	16	10	12	9	13	11	1	134	1·23
Burning sensation in feet ...	2	0	3	6	3	3	2	1	3	6	2	0	31	·28
Total ...													232	2·13
IX EYE DISEASES.														
Blepharitis ...	0	0	0	0	1	0	0	0	0	0	0	0	1	0
Stye ...	1	0	0	0	0	0	0	0	0	0	0	0	1	0
Trichiasis ...	0	1	0	0	0	0	0	0	0	0	0	0	1	0
Obstruction of Nasal duct ...	0	0	0	0	0	1	0	0	0	1	0	0	2	·01
Conjunctivitis ...	2	12	18	21	31	74	55	24	18	14	0	2	271	2·49
Pterygium ...	0	0	0	0	0	0	0	0	0	2	1	0	3	·02
Keratitis &c. ...	7	10	17	5	7	21	16	15	7	9	4	4	122	1·12
Opacity of Cornea ...	4	8	3	4	4	6	2	2	9	9	5	0	56	·51
Iritis														

Glaucoma ...	0	3	3	2	6	0	0	2	2	5	3	1	27	·24
Myopia, Presbyopia etc ...	1	1	3	3	0	6	3	1	0	7	1	0	26	·23
Night blindness ...	2	9	2	7	15	16	9	7	1	3	2	0	73	·67
Total blindness from destruction of eye & other causes	3	7	10	5	5	9	3	12	4	16	5	2	81	·74
Foreign bodies and Injuries ...	0	0	3	0	1	2	0	0	0	0	0	0	6	·05
Total ...													983	9·04
X DISEASES OF NOSE.														
Ozœna ...	1	0	0	0	1	0	1	0	0	0	0	0	3	·02
Epistaxis ...	2	0	0	3	0	0	0	1	0	1	1	0	8	·07
Polypus ...	0	0	0	0	0	1	0	0	0	0	0	0	1	0
Foreign bodies ...	1	1	0	0	1	0	0	1	0	0	0	0	4	·03
Occlusion of nostril ...	0	1	0	0	0	0	0	0	0	0	0	0	1	0
Pain in nose ...	0	0	0	0	0	1	0	0	0	0	0	0	1	0
Total ...													18	·16
XI DISEASES OF EAR.														
Earache ...	4	3	3	12	10	7	8	5	8	19	3	3	85	·78
Otorrhœa ...	8	5	10	11	11	10	8	9	19	18	9	4	122	1·12
Foreign bodies ...	0	1	0	1	2	1	0	1	0	1	0	0	7	·06
Deafness ...	2	6	7	7	8	7	4	4	5	13	4	0	67	·61
Tinnitus ...	0	0	1	0	0	0	0	0	0	1	0	0	2	·01
Total ...													283	2·60
XII MISCELLANEOUS.														
Ulcers ...	19	10	13	8	17	25	18	20	22	18	15	4	189	1·73
Abscesses ...	6	11	18	14	17	13	15	10	11	14	0	4	133	1·22
Carbuncle ...	1	0	0	0	0	0	0	1	0	0	0	0	2	·01
Deformity from cicatrisation ...	0	0	0	0	0	0	0	0	0	1	0	0	1	0
Wounds ...	1	5	8	7	9	11	4	6	4	1	3	0	59	·54
Injuries by Animals ...	0	1	1	2	3	4	0	1	2	2	0	0	16	·14
Burns ...	8	3	2	0	3	4	3	6	4	0	7	1	41	·37
Tumours ...	4	1	7	6	6	14	1	2	9	7	2	1	60	·55
Hiccough ...	0	0	0	0	0	0	0	0	0	1	0	0	1	0

Table IV.—*The more prevalent diseases in the order of their frequency, wi*

Disease.	No. of Cases.	Percentage of Total Cases.	JANUARY.		FEBRUARY.		MARCH.		APR	
Scabies ...	1971	18·14	173	23·15	223	28·51	157	15·11	135	14
Fevers ...	1646	15·14	113	15·12	91	11·63	171	16·45	134	14
Dyspepsia and Constipation ...	1004	9·24	77	10·30	63	8·05	76	7·31	82	
Bronchitis ...	398	3·66	47	6·29	42	5·37	34	3·27	19	2
Cataract ...	306	2·81	22	2·94	19	2·42	34	3·27	19	2
Lumbago, Sciatica &c. ...	293	2·69	17	2·27	19	2·42	36	3·46	20	2
Conjunctivitis ...	271	2·49	2	·26	12	1·53	18	1·73	21	2
Dysentery & Dysenteric Diarrhœa	262	2·41	10	1·33	10	1·27	19	1·82	21	2
" Burning Urine" ...	221	2·03	17	2·27	18	2·30	16	1·53	24	2
Toothache ...	214	1·96	7	·93	9	1·15	18	1.73	29	3
Diarrhœa ...	213	1·96	5	·66	8	1·02	20	1·92	20	2
Debility, Starvation &c. ...	210	1·93	18	2·40	21	2·68	19	1·82	11	1
Ulcers ...	189	1·73	19	2·54	10	1·27	13	1·25	8	
Ringworm ...	187	1·72	11	1·47	3	·38	5	·48	9	
Catarrh &c. ...	181	1·69	19	2·54	12	1·53	40	3·84	10	1
Hydrocele ...	162	1·49	9	1·20	13	1·66	12	1·15	12	1
Headache ...	161	1·48	8	1·07	9	1·15	23	2·21	9	
Leprosy ...	159	1·46	12	1·60	7	·89	15	1·44	26	2
Spleen ...	146	1·34	11	1·47	5	·63	16	1·53	15	1
Pain in joints ...	134	1·23	11	1·47	16	2·04	16	1·53	8	
Abscesses ...	133	1·22	6	·80	11	1·40	18	1·73	14	1
Influenza ...	125	1·15	0	0	0	0	1	·09	68	7
Keratitis &c. ...	122	1·12	7	·93	10	1·27	17	1·63	5	
Otorrhœa ...	122	1·12	8	1·07	5	·63	10	·96	11	1
Rheumatism ...	117	1·07	9	1·20	4	·51	11	1·05	2	
Cardiac ...	103	·95	6	·80	8	1·02	10	·96	11	1
Anæmia ...	102	·93	10	1·33	2	·25	13	1·25	4	
Total ...	9155=	84·26								

numbers treated each month, and the percentage of these numbers to the monthly totals.

May.		June.		July.		August.		September.		October.		November		December	
123	12·90	73	7·24	68	8·91	102	11·28	176	16·50	383	25·87	250	30·52	105	27·20
83	8 70	118	11·71	109	14·28	193	21·68	161	15·09	229	15·31	162	19·78	79	20·46
85	8·91	114	11·32	70	9·17	90	9·95	108	10·13	142	9·51	62	7·57	34	8·80
14	1·46	41	4·07	22	2·87	18	1·99	29	2·72	68	4·55	38	4·63	26	6·73
31	3·25	33	3·27	18	2 35	16	1·76	25	2·34	50	3·35	31	3·78	8	2 07
23	2·41	26	2·58	27	3·53	25	2·76	32	3·00	46	3·08	17	2·07	5	1·29
31	3·25	74	7·34	55	7·20	24	2·65	18	1·68	14	·93	0	0	2	·15
28	2·93	26	2·58	28	3·63	47	5·19	27	2·53	29	1·94	12	1·46	5	1·29
35	3·67	33	3·27	8	1·04	15	1·65	16	1·50	16	1·07	17	2·07	6	1·55
22	2·30	20	1·98	13	1·70	14	1·54	37	3·47	34	2·27	5	.61	6	1·55
45	4·72	20	1·98	30	3·93	21	2·32	20	1·87	15	1.00	2	·24	7	1·81
18	1·88	10	·99	19	2·49	18	1·99	23	2·15	28	1·87	18	2·19	7	1·81
17	1·78	25	2·47	18	2·35	20	2·21	22	2·06	18	1·20	15	1·83	4	1·03
8	·83	32	3·17	17	2·22	29	3 20	35	3·28	30	2·01	6	·73	2	·51
20	2·09	12	1·19	9	1·17	14	1·54	25	2·34	15	1·00	3	·36	5	1 29
21	2·20	19	1·88	17	2·22	8	·88	12	1·12	24	1·60	8	·97	7	1 81
17	1·78	7	·69	12	1·57	15	1·65	37	3·47	9	·60	9	1·09	6	1·55
20	2·09	24	2·38	7	·91	7	·77	15	1·40	11	·73	9	1·09	6	1·55
16	1·67	8	·79	8	1·04	9	·99	9	·84	31	2·07	11	1·34	7	1·81
11	1·15	16	1·58	10	1·31	12	1·32	9	·84	13	·87	11	1·34	1	·25
17	1·78	13	1 29	15	1 96	10	1·10	11	1·03	14	·93	0	0	4	1·03
45	4·72	2	·19	6	·78	3	·33	0	0	0	0	0	0	0	0
7	·73	21	2 08	16	2 09	15	1·65	7	·65	9	·60	4	·48	4	1·03
11	1·15	10	99	8	1 04	9	·99	19	1·78	18	1·20	9	1·09	4	1·03
13	1·36	15	1·48	10	1·31	12	1·32	9	·84	20	1·34	9	1·09	3	·77
10	1·04	11	1·09	8	1·04	6	·66	18	1·68	10	·67	3	·36	2	·51
5	·52	10	·99	7	·91	10	1·10	11	1·03	18	1·20	9	1·09	3	·77

Table V.—*Analysis of Fever Cases, showing the number treated each month, the proportion of that number to the monthly total, and the proportions of the various types of fever in each month.*

TYPE OF FEVER	Jan.		Feb.		March.		April.		May.		June.		July.		Aug.		Sep.		Oct.		Nov.		Dec.		Total.	Percentage.
Quotidian ...	63	55·76	30	32·96	27	15·78	50	37·30	27	32·53	40	33·89	29	26·60	83	42·34	63	39·13	107	46·72	84	51·85	34	43·03	637	38·69
Tertian ...	5	4·42	2	2·19	5	2·92	9	6·71	1	1·20	11	9·32	5	4·58	7	3·57	16	9·93	17	7·42	8	4·93	7	8·86	93	5·65
Quartan ...	19	16·81	21	23·07	35	20·46	20	14·92	32	33·55	29	24·57	31	28·44	33	16·83	24	14·90	53	23·14	29	17·90	11	13·92	337	20·47
Irregular, Remittent, Continued or Unclassified	26	55·76	38	41·75	104	60·82	55	41·04	23	27·71	38	32·20	44	40·36	73	37·24	58	36·02	52	22·70	41	25·30	27	34·17	579	35·17
Total ...	113		91		171		134		83		118		109		196		161		229		162		79		1646 =15·14o/o of General Total.	
Percentage of Monthly Total ...	15·12		11·63		16·45		14·77		8·70		11·71		14·28		21·68		15·09		15·34		19·78		20·46			

NOTE: The second column under each month shows the percentage of the types of fever to the total number of fever cases for the month.

Table VI.—*Shewing the number of children absent from School from sickness during each month of the year.*

Month	Jan.	Feb.	March.	April.	May*	June.	July.	August.	Sep.	Oct.	Nov.	Dec.
Number on Roll ...	90	106	99	62	60	68	99	91	112	113	117	108
Number absent once or oftener during the month from sickness.	35	30	42	15	3	19	40	58	52	48	46	48
Percentage of number absent to number on Roll.	38·88	28·30	42·42	24·19	5·00	27·94	40·40	63·73 2 deaths	46·42	42·46	39·31	44·44

* May was a holiday month when the school was closed for three weeks.

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OBSERVATIONS
ON
EPIDEMICS OF CHOLERA IN INDIA,

WITH SPECIAL REFERENCE TO THEIR IMMEDIATE CONNECTION WITH PILGRIMAGES.

ABSTRACT OF COMMENDED THESIS FOR THE M.D.
DEGREE, SUBMITTED TO THE MEDICAL
FACULTY OF THE UNIVERSITY
OF GLASGOW.

BY

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OBSERVATIONS ON EPIDEMICS OF CHOLERA IN INDIA,

WITH SPECIAL REFERENCE TO THEIR IMMEDIATE CONNECTION WITH PILGRIMAGES.

ORISSA has been described as being to India what Jerusalem was to the whole land of Israel. It is the holy land of the Hindus. As the Israelites went up to worship at Mount Zion, so do the inhabitants of the various provinces of India go on pilgrimages to the great temple of Jagannath. The city of Puri, perhaps more familiarly known as "Juggernauth," situated in the south-eastern corner of the Orissa division of Bengal, distant 300 miles from Calcutta, has a population of 28,794 individuals, and an area of 3 square miles. It is the headquarters of a district which has an area of 2,473 square miles, and a population of 944,988 persons, of whom only a comparative few do not profess the Hindu religion.

For many hundreds of years Puri has been the scene of an interminable entrance and exit of religious devotees to worship at the shrine of Jagannath, or take part in the numerous Hindu festivals for which this sacred city is famous, and of which the most important are the Dole Jatra (Swing Festival) in March, the Rath Jatra (Car Festival) in June or July, and the Panchak or five day Festival in October or November.

From its intimate connection with regularly recurring outbreaks of cholera, few Indian cities have received such prominence in medical literature. It has been called a plaguespot, the valley of death, a pest-house whence streams of disease constantly issue, and the ever open grave of throngs of pilgrims. Having been responsible for the health of this vast community during the past two years, a few and pilgrim populations of the district, and of such universal concern, may not be uninteresting to my former teachers in the University of Glasgow, who are still living, and to others whose privilege it has not been to witness such terrible epidemics as occur during pilgrim assemblies throughout the Indian Empire, and nowhere more frequently than in the town and district of Puri.

It is estimated that during July, 1893, when the Re-incarnation of Jagannath was to have taken place, no less than 200,000 pilgrims assembled, which will give some idea of the extent to which overcrowding occurs in the town on such important occasions, not to speak of the halting stations along the whole length of pilgrim routes.

In all such gatherings there is a preponderance of females, which is one of the principal causes of the higher mortality from cholera amongst them than amongst males.

The male community, as a rule, are the more intelligent, and are not so easily induced by pilgrim hunters (who scour the country dilating upon the numerous blessings said to be derived from a pilgrimage to the holy city) to undertake the journey as women are, who readily yield to the pressure brought to bear upon them by this body of wily emissaries, who present to their view a hideous picture of all the torments which will be meted out to them in a future world if they fail to fulfil that condition—a pilgrimage to Puri—which they solemnly affirm, but may not themselves believe, to be essential to the salvation of their souls. On the other hand, women are less able to endure the fatigue and depressing influence of long and tedious marches, and are, notably, more ignorant and regardless of the consequences of disobeying the ordinary laws of health. This constitutes a reason why females are so prone to contract the disease. Amongst no class of native women is disregard for cleanliness in their persons, in eating, and in drinking, more strikingly exemplified than amongst low caste Bengalees, and it is a general belief amongst the inhabitants of Orissa, that cholera of a severe up-country people, an opinion to which personal observation warrants me in subscribing. With these few preliminary remarks, I shall proceed to discuss the dissemination of the disease by pilgrims amongst themselves and throughout the district. I shall endeavour to show, from observations during two severe district epidemics in 1894, that the disease was imported, and that during the beginning of the epidemics pilgrims alone were attacked. I shall further show that the disease confined itself to pilgrim routes.

I do not deny that outbreaks of cholera may occur simultaneously, and at a considerable distance from pilgrim routes, but I venture to belive, if it were possible to investigate all such occurrences during pilgrim seasons, it would be found in the great majority of instances that the primary cause was the arrival of pilgrims affected with the disease, or a member of the district community arriving in his native village already suffering, or who had been exposed to the disease prevailing amongst pilgrims along pilgrim routes, and attacked on his arrival. In India more difficulty is experienced in arriving at definite conclusions than in almost any other country in the world regarding the progress of epidemics and other points in their history, owing to the very large areas over which civil surgeons exercise medical and sanitary control, and the absolute impossibility on that account of going at once to the place of outbreak in every instance.

I shall first deal with two epidemics during the year 1894.

Epidemic of Cholera during the Rath Jatra (Car Festival) of 1894, from 2nd July to 13th August.—One sporadic case of cholera occurred in the town of Puri during the month of January, 6 cases were reported in February, 12 in March, and 2 in April. One case was reported in May. No cases were reported in June. Pilgrims began to arrive in large numbers, and on 2nd July cholera was reported to have broken out amongst them. From the 2nd to 9th the daily admissions into hospital were 3, 11, 19, 20, 10, 2, 3, and 3 respectively. The disease began to abate. From the 10th to the 28th the admissions were 1, 1, 2, 1, 2, 1, 2, 1, 1, 1, 3, 1, 1, 1, and 2 respectively, only four days being excepted—viz., 13th, 17th, 18th, lasted till 13th August. By this time the pilgrims had departed. From the 1st to 13th August the number of cases reported daily by the police were 0, 0, 2, 1, 1, 0, 2, 1, 0, 0, 0, 0, and 2 respectively, which shows that the disease had nearly exhausted itself in the month of July. It was evident, from facts which were observed, that the disease had originated amongst the pilgrims somewhere on their march, and my attention was accordingly directed to the Jagannath Road, along which I proceeded on 3rd July. This road extends in the district of Puri to a distance of something like 43 miles. Satybadi, Pipli, and Baliunta Hospitals are situated 12, 24, and 40 miles respectively from the town. In each of these hospitals, and on the road thither, I saw ample evidence of the dreadful havoc being wrought amongst cholera-stricken pilgrims, and in order to prove that the disease was imported, so far as the town is concerned, the following details are supplied :—

First Group of Imported Cases.—A female pilgrim, aged 23 years, was admitted into Satybadi Field Hospital on 3rd July, suffering from cholera, having been attacked on the previous day. She was accompained by her mother and brother, who stated that they left home with ten companions fifteen days previously, and joined another batch of pilgrims belonging to Sonamukhi, in the district of Bankura. All the other members of this party proceeded to Puri. One of them, a female, aged 30, on her arrival on the evening of 2nd July, was attacked with cholera ; a second arrived suffering from it ; a third was attacked on 3rd July, who stated that she had diarrhœa on the road, but did not know where ; a fourth was attacked on the same day ; two were attacked on the 4th. The pandah (pilgrim-hunter) who escorted this company of unfortunate pilgrims, stated that they had passed cholera patients at Haldiapara, Surna, Bhadruck, Baitarni, Nalpur, Tanghi, Telingapet, Bhubeneswar, and Sardaipur, all villages situated on the pilgrim road, leading through the districts of Balasore, Cuttack, and Puri, or, in short, throughout the entire length of the Orissa Division. A connecting link was discovered in the Pipli Hospital, in another female pilgrim, aged 28 years, belonging to the batch of pilgrims with which we have just dealt, who was admitted suffering from cholera on 1st July. She stated that she had been suffering from diarrhœa for two days previously, which means that she was well outside the Puri jurisdiction when she contracted the disease. Presumably she had infected the other members of the company who were attacked on their arrival in Puri, or that they were all exposed to the contagious principle at the same moment. It is important to note in this connection that, according to the Sanitary Commissioner's Bengal Monthly Statistical Report, 35 deaths in the deaths occurred in June, but the disease was confined almost entirely to places not frequented by pilgrims; and I have already said we had no cholera in the town of Puri during the month of June.

Second Group of Cases.—A Hindu female pilgrim, aged 25 years, was found lying on the roadside in a helpless condition, suffering from cholera, and admitted into the Satybadi Field Hospital on 1st July. She was accompained by a female companion, with whom she left home on 13th June. Not knowing the way to Puri, they joined a batch of forty pilgrims belonging to the district of Manbhum and town of Purulia. One of her company, also a female, died from the disease at Tanghi, in the district of Cuttack. She stated that a male member of the company, belonging to Purulia, and a female, belonging to Manbhum, were left in the hospital at Pipli, both of whom I afterwards saw, and thus verified her statement.

In another case in the Pipli Hospital, there was a history of griping pains in the belly four days previous to the attack, most probably of a choleraic nature, and the beginning of the disease. In yet another case, also a woman, there was a history of illness of four days duration previous to her admission into hospital. The patient stated that she was one of a company of eight pilgrims, and that another female was treated by a Civil Hospital assistant for diarrhœa at Jobra, in Cuttack, and allowed to proceed on her journey.

Third Group of Cases.—On the day of proceeding to enquire into this outbreak, I passed, two miles outside of municipal limits, a bullock cart conveying the dead body of a female, who had just succumbed to the disease, having been attacked the previous evening (2nd July). One female, aged 36, belonging to the same company as the deceased, was admitted into the Pipli Hospital on 30th June. A second, age 45, arrived in Puri on the evening of 3rd July, and was attacked during the same night. Two others were attacked on the 4th, early in the morning. It is now more than probable that the high death-rate in Balasore and Cuttack districts during June, from facts elicited in these groups of cases, was composed to a very large extent of deaths amongst pilgrims. It is beyond question that pilgrims conveyed the disease within the jurisdiction of Puri, whatever doubt may exist as to the primary source of infection.

Fourth Group of Cases.—Sadoni, Hindu female, aged 30 years, belonging to Haripur, Dumka, arrived at Puri on 4th July, at 3 P.M. She was attacked with cholera on the same day. Hari Ghar, a male relative of the patient, who was preparing to leave the town when I arrived at the lodging-house in which he was residing, informed me that he and thirty-six other pilgrims went aboard the steamer at Calcutta. When in the canal one of their company, a female, died from cholera, and her dead body was thrown overboard. On being questioned, lodging-house in which Hari Ghar was living, I felt satisfied that his story was reliable.

Besides numerous other histories of a similar kind, we have one of three persons, who arrived at Puri on the same day, travelled in another infected steamer together, belonged to different companies, lived in different lodging-houses, and were attacked with cholera on the same day and at precisely the same hour. When we know how pilgrims live aboard steamers, it is not so difficult to understand how they pick up the germs of the disease as it is to understand why so many escape them.

First Case amongst Inhabitants of Puri Town.—On 3rd July a male servant of one of the Puri deputy magistrates arrived at Satybadi, having walked alongside a palki all the way from Cuttack, a distance of 41 miles. He remained at this village all night. He took for his evening meal parched rice, and drank the water of the village tank, in which linen, soiled with choleraic dejecta, had been washed. He proceeded to Puri on the morning of the 4th, and was attacked with cholera on the morning of the 5th. After having had three loose stools, he went to the town to witness the Car Festival. He died the same evening. This was the first inhabitant of Puri town attacked during the epidemic, and up to the time of his attack, no less than 52 cases had occurred amongst pilgrims. It was late in the epidemic before the inhabitants were affected to any appreciable degree, the disease having in a most definite manner marked out pilgrims as its victims. The history of the case described above goes very far towards making it highly probable that the period of incubation of cholera is considerably under three days. Pilgrims are excluded from Cuttack, which is a cantonment town and military station, and as only one case of cholera occurred therein during the month of June, it is more than probable that the deceased servant was exposed to the disease germs between the 3rd of July, when he left Cuttack, and the forenoon of the 5th, the day after his arrival in Puri. It is almost a certainty that he imbibed the germs at Satybadi, which must have been after 6 P.M., because I saw the palki arrive, and, if so, the period of incubation in his case did not extend over thirty-eight hours. I considered it advisable to introwith this particular case, in view of a further reference to the question when I come to deal with other cases, which point to a similar conclusion.

Effect of the Epidemic on the District Population, and the Result of Human Intercommunication.—A robbery of grain took place at a village called Ali Sasan, situated 5 miles from the pilgrim road in the neighbourhood of Pipli. There was no case of cholera in the village at that time. Twelve of the inhabitants, all men, supposed to have been implicated in the theft, were arrested by the police. They were admitted into Puri jail as under-trial prisoners on the evening of 23rd July, having been in police custody from the evening of the 20th. We have every reason to believe they were not exposed to infection or contagion of any kind till their march along the pilgrim route on the 23rd. They were kept apart from the rest of the prisoners, as is customary in Indian jails, and more particularly during epidemics of cholera, under observation. No symptom of the disease manifested itself in any of them while in the jail as under-trial prisoners. On the 25th they were taken to court to give an account of themselves. While in the lock-up, waiting the call of the magistrate, one of them was seized with a desire to defœcate, and was allowed to go out under police escort. I found him soon afterwards in a collapsed state, lying within ten feet of the Cutcherry well surrounded by his dejecta, and deserted by the police and everybody else. He was removed to the cholera hospital, where he died the same evening. A servant of the prosecutor in this case, who belonged to the same village, arrived in the town on the morning of the same day, and was attacked with the disease on the evening of the 24th. Artha Mullick, whose name transpired in the evidence, accompanied the prisoners along with the police sub-inspector who had charge of them. He was also attacked with cholera on the evening of the 24th. The movements of the sub-inspector were lost sight of. The remaining eleven accused were received back into jail as convicts under sentence of five months' imprisonment each on the afternoon of the 25th. One of them had two loose stools on his return; a second was attacked with cholera on the following day, 26th, at 7·30 A.M.; a third on the 28th at 10 A.M.; a fourth on the 29th at 8 A.M.; and a fifth, a brother of the fourth, on 1st August. The third died, the others recovered. The further history of these prisoners showed that they had drank water from a dirty tank, much frequented by pilgrims for indiscriminate purposes, on the roadside. This was the first time they had quenched their thirst on the road. It is noteworthy here that the first prisoner was attacked with the disease within forty-one hours after his admission into jail, and, allowing three hours from the time, there is sufficient reason to belive he imbibed the germs, which would enable him to reach Puri, the period of incubation could not have been more than forty-four hours, and in the second case, not more than forty-seven hours; while in the case of the prosecutor's servant who accompanied them, only thirty-three hours had elapsed from the probable time of exposure to the germs. In those three cases, allowing the widest possible margin, it is highly presumable that the incubation period was not more than forty-eight hours. With regard to the other cases, there are so many side issues to the question that no conclusion can be formed on the point under discussion. Probably the fifth prisoner attacked contracted the disease while attending his brother, who was fourth on the list, and that all the others had contaminated each other. Granting, however, that the whole batch (except the fifth) had ingested the germs at the same moment, the longest period of incubation in any of the cases could not have been over 132 hours, which is 156 hours less than the limit fixed by Parkes.

For the following information about epidemics in some district villages, I am indebted to Mr. Hugh M'Pherson, member of the Indian Civil Service, sub divisional officer of the district in which the villages are situated, who kindly, at my request, took the trouble to make a personal enquiry into them:—

1. Amir Khan, a Musulman, returned to his native village after having attended the Car Festival, suffering from cholera. He travelled over 50 miles along the pilgrim road. On his return journey he halted for two days at a village called Ranpur. His wife was next attacked; both recovered. A neighbour was afterwards attacked and died. Cholera also broke out in Ranpur village as the result

the two villages previously. There were altogether 40 attacks, with 24 deaths, up to the date of these notes.

2. Krushno Jena, aged 40 years, visited Puri during the same festival, accompanied by five companions. One and a half days after his return to his native village called Atiri, 40 miles from Puri, and situated on a pilgrim road, he was attacked with cholera, and died on 6th July, within sixteen hours of his arrival. None of his companions were attacked. Four brothers, living in another house 15 yards distant, were next attacked. One died on the 10th, and another on the 11th. The houses of sixteen other sufferers were all within 100 yards of these cases. The clothes of the first case were reported to have been washed in the backyard of the deceased with water taken from the village well, which means that they were washed after ordinary native village fashion near the mouth of the well, which was flush with the ground. No cholera existed in this village previous to the arrival of the first case mentioned above. Up to the date of taking these notes there had been 23 attacks, with 19 deaths, in the village.

3. Baji Majhi, aged 50 years, attended a marriage ceremony in the village of Atiri, in the house of Mohan Patar, on 6th and 7th July, at the time of Krushno Jena's death. Mohan Patar was one of the four brothers mentioned as havtng been attacked in the same house in Atiri, and was one of the unfortunate two who died. Bajhi Majhi was attacked with cholera on his return to his own village on 9th, and died on 10th July. The disease spread, 16 deaths having occurred up to date of enquiry.

4. Nila Barik, aged 30 years, belonging to another village, attended the same marriage ceremony. He was attacked with cholera on his return home on 9th, and died on the 10th July. He complained of abdominal disorder on 8th July. He was the origin of an epidemic in which thirty had been attacked up to the date of investigating the outbreak. Of these, nineteen died, six recovered, and five were still suffering. With one exception (the person in whose case an exception is made visited the others) they all lived

which clothes are washed. In one house no less than ten persons were attacked, of whom eight died and one recovered. One was still suffering.

In this series of cases we have examples of the dreadful results of human intercommunication during epidemics of cholera, the first cases being clearly traceable to the epidemic under report during the Car Festival. It is noteworthy that, on the days of the marriage ceremony (6th and 7th July), cholera *actually* existed in the house in which the ceremony was held. The disease did not exist in the village till the 6th. The period of incubation could not, therefore, allowing for all possible contingencies, have been over twenty-four hours in the first cases. Nila Barik had abdominal disorder on the 8th. Baji Majhi was attacked on his return home on the 9th. In both those cases the presumption is that the period was well within forty-eight hours. I regret that the precise hour of attack could not be ascertained. Further information on this point could not have lengthened the period, but might have reduced it. All the above cases appear to point to the water supply as the principal vehicle in the dissemination of the disease germs, and as I have the history of another village epidemic which I investigated, and which also supports the "water-borne" theory, and gives another illustration of the effects of human intercommunication, I may just as well give the details of it.

Baji Mullik arrived at his home, in a village called Sewla, which has a population of 300 individuals, suffering from cholera, having been attacked on the road. He carried with him some soiled linen which were washed in a small tank at the end of his house. Four yards from the doorstep was a shallow unprotected well from which their own and their neighbour's domestic supply was obtained. There is hardly the shadow of a doubt that this well was contaminated. In fact to avoid it was an utter impossibility. Four other members of the family, to which the first person belonged, were attacked. One was attacked in the neighbouring house. In a third house three were attacked and all died. In a fourth three were attacked of whom one recovered. The father of the third family nursing him, but was not attacked himself. The first two families used the same well. The fourth had abandoned the use of their own private well, the water of which they said was bad, and derived their supply from a well in the neighbourhood of the first three affected houses, situated about 200 yards off. Eighteen persons were attacked, of whom fourteen died before the epidemic exhausted itself.

Geographical Distribution of the Disease during the Epidemic, showing how exclusively the Disease confined itself to Pilgrim Routes.—Bhubeneswar Temple, situated two miles off the direct pilgrim route, practically on the boundary line betwixt the Cuttack and Puri districts near Baliunta, is almost as important to pilgrims as the Temple of Jagannath, the great majority of whom visit it either going to or returning from Puri. There were no deaths from cholera at Bhubeneswar during the months of May and June. Directly the pilgrims began to arrive cholera broke out in the neighbouring villages, the inhabitants of which frequently visit Bhubeneswar. Out of 178 deaths from cholera in Khurda sub-division, which includes Bhubeneswar, 177 occurred in that portion of it which is frequented by pilgrims.

In the Banpur circle of the district, which is practically cut off from pilgrim communication, and whose population is 94,949, and which has an area of 360 square miles, no deaths occurred during July, and only two in August. In Gope circle, with an area of 337 square miles and a population of 134,308 souls, situated outside the area of pilgrim traffic, and in which the roads are rendered almost impassable owing to floods at this season of the year, only eleven deaths occurred tn July and thirteen in August.

In the town of Puri, Puri Sadar circle, Pipli, and Khurda, much under pilgrim influence, a very different result was shown.

In the town, 109 deaths occurred during the epidemic, of which 75 were amongst pilgrims.

In Puri Sadar circle, with an area of 865 square miles and a population of 200,273 persons, out of a total of 517 deaths during the year 1894, only 31 did not occur during pilgrim seasons; 169 occurred during the Car Festival. And in a second epidemic, which I shall deal with later on, and which occurred simultaneously with the arrival of pilgrims for another festival, 62 deaths from cholera were reported in this circle.

In Pipli circle, with an area of 325 square miles, and a population of 241,470 persons, out of 715 deaths from cholera during the year 1894, 211 occurred during the Car Festival months, and 144 in the second epidemic. Only 79 deaths did not occur during pilgrim seasons.

In Khurda circle, with an area of 583 square miles, and a population of 234,730 people, through which a pilgrim route to the Central Provinces passes, and in which Bhubeneswar is situated, out of 334 deaths from cholera during the year, 180 occurred during the Car Festival. Only 24 did not occur during pilgrim seasons.

A reference to the experience of the preceding year (1893), which was a highly auspicious one for pilgrimage, and when, as we have already mentioned, 200,000 pilgrims attended the Car Festival, still more conclusively demonstrates the intimate relationship which exists between pilgrim seasons and epidemics of cholera.

In 1893, out of 271 deaths in Puri town from this disease, 245 occurred in July and August. In Puri Sadar circle, 310 out of 522 deaths; in Pipli circle, 333 out of 610; in Khurda circle, 98 out of 163; while in Gope circle only 8 out of 183, and in Banpur circle 8 out of 12 deaths, during the year, occurred in July and August. In the last mentioned circle only 2 occurred in July. It will be noticed that Gope and Banpur, which are not subjected to pilgrim influence, shew a very small death-rate from cholera during July and August compared with the other circles.

Second Epidemic of Cholera, from 6th October to 28th November, 1894, occurring in the town of Puri simultaneously with the arrival of Pilgrims.

Importation of the Disease.—The first epidemic ceased on 13th month of October, in the early part of which I left to make the quarterly inspection of Pipli and Baliunta dispensaries. No sign of cholera was seen anywhere on the road, which was swarming with pilgrims proceeding to Puri. On the morning of the 4th October I reached Baliunta, when I was informed by the Civil Hospital assistant in charge of the hospital that the last of three pilgrims admitted suffering from cholera had just died. The other members of the company to which these three belonged must have passed me on the road. On the 7th October I received a telegram from the assistant health officer informing me that cholera had broken out in the town on the 6th, and that ten patients, all pilgrims, belonging chiefly to the district of Midnapore, had been admitted into hospital. The daily admissions were as given in the following statement:—

October,	6	7	8	11	12	13	16	19	22	23	24	26	27	28	29	31
Admissions,	5	7	1	3	2	3	3	2	2	2	1	1	3	7	3	2

November,	2	3	6	9	11	12	13	14	15	16	17	20
Admissions,	1	1	2	4	5	6	6	4	2	1	1	1

During this epidemic 135 cases were reported by the police, with 101 deaths, including all the deaths in the hospital.

The following histories of cases during this epidemic are given to show the connection with the first cases admitted into Baliunta Dispensary. They at the same time prove that the disease was again imported into the town by the pilgrims:—

1. Podi, Hindu female, aged 50 years, was one of a batch of forty-one pilgrims who left home fifteen days previously. She arrived at Puri on the night of the 5th October, and was attacked with cholera on the 6th at 6 A.M. A pilgrim belonging to another company with whom they mixed was attacked with cholera near Baliunta.

2. Orui Bewa, Hindu female, aged 50 years, left home thirteen days previously, and arrived at Puri on the evening of 5th October. She was attacked with cholera on the 6th at 7 A.M. She belonged to a party consisting of thirty-two pilgrims. She stated that one of the party whose name she did not know, but who was known as Ram Barik's mother, was left behind at Pipli Hospital suffering from the same disease.

3. Audika, Hindu female, aged 30 years, living in the same lodging-house as No. 2, has precisely the same history.

5. Kusto Sahu, Hindu female, aged 50 years, left her home one month before in company with twenty other pilgrims. They obtained their water-supply from wells, roadside tanks, ditches, and pools. They passed two cholera patients, both pilgrims, lying on the road near Puri. She arrived on the evening of the 4th October, and was attacked during the night of the 6th.

6. Pari, Hindu female, aged 24 years, was found dead near a sacred tank at the entrance to the town. As a heavy shower of rain was falling, she was left to her fate under a tree on the roadside, four miles from Puri, but managed to reach the tank before expiring. Her husband, who was accidentally discovered, made the above confession, and acknowledged that the deceased person was his wife.

7. Sunder Sino, Hindu male, aged 35 years, left his home fifteen days before in company with twenty-two other pilgrims. They marched 10 or 15 miles daily. He arrived at Puri at 11 A.M. on 5th October, and was attacked with cholera during the night of the 6th. One of the party was attacked at the Baitarn river, near Jajpur, in the district of Cuttack; and, as they left him behind, it was unknown and of no interest to them whether he recovered or died.

If it were necessary to cite more cases to prove importation into the town and even into the district, the many that could be added would, in a no less dicided or definite manner, prove the correctness of our argument and show conclusively that pilgrimages and cholera are almost inseparably related to each other, and that when epidemics do not occur during pilgrim seasons the fortunate and happy result must be ascribed to phenomena, atmospheric, telluric, or other, about which we have still much to learn.

Two Points of Special Interest in Connection with the Second Epidemic.—(1) The epidemic somewhat abated from 16th to 21st October, when it again took on violent action. The steamer *Balaram* arrived at Cuttack early on the morning of the 18th, crowded with pilgrims bound for Puri. Two cases of cholera occurred on board on the 17th, and a third on the morning of the 18th. One of them died. The other two were landed alive. One of them was afterwards found dying on the roadside, four miles along the road from Cuttack to Puri. The other pilgrims proceeded on their journey with the result that, on their arrival, the disease assumed greater previously given that on the 28th, the date of the Kali Pujah, there were seven admissions.

(2) There was a lull in the epidemic afterwards, the cases admitted to hospital being on the 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, and 8th November, 0, 1, 1, 0, 0, 2, 0, and 0 respectively. The first day of the Panchak Festival occurred on the 9th November, and the number of pilgrims again increased. From this date till the 13th, the last day of this festival, the number of admissions were 4, 0, 5, and 6: and from the 14th to the 20th, 4, 2, 1, 1, 0, 0, and 1 respectively. No cases were admitted after that to the hospital, but the police reported from the 21st to the 28th, the date on which the epidemic ceased, 1, 0, 0, 0, 0, 0, 1, and 2 respectively. No cholera occurred in the town during the rest of the year, but a death *supposed* to have been due to the disease was reported by the police on 5th December. There is a belief amongst Hindus that residence in this holy town during the month of Kartik (October or November) increases their sanctity. During this month most of the residents fast the whole day, and take mohaprasad (rice cooked in the temple of Jagannath) at night only. The last five days of the month of Kartik constitute the Panchak or five day festival, and it is very striking that the epidemic increased in intensity during this period.

During the past eleven years the highest number of deaths from cholera in the town of Puri have occurred in those months when the principal festivals of the year were held; for, out of a total of 4,262 deaths from this cause during these years, no less than 3,802, or 89 per cent, originated with the arrival of pilgrims. The same thing was observed as far back as the year 1868, when, in the first annual sanitary report, the civil surgeon then in charge of Puri district remarked:—"Cholera is a constant visitor, and frequently breaks out amongst the pilgrim assemblies at the several religious fairs held in the district."

In several years following similar observations were recorded and remarked on, thus:—"The pilgrims visiting the place suffered most severely." "The disease, on the whole, confined itself to the outbreaks; the first was started by pilgrims, and was extinct at the end of March; the second occurred in June amongst pilgrims, and ceased in July."

In 1874 it was noticed that wherever rapid communication and a comfortable mode of conveyance occur along pilgrim roads, as at Gaya (not at Puri), cholera decreased, and did not spread to the people generally. One of my more immediate predecessors has remarked :—"The see-sawing movement is so striking that no one residing in the place for some time can fail to notice it."

These points have been specially touched upon in view of the diversity of opinion regarding the effect of pilgrims in the dissemination of cholera throughout India.

Whatever be the case with regard to other provinces and districts in India, I think I have produced abundant and conclusive evidence that, so far as Puri is concerned, the disease is invariably imported; and where outbreaks in district villages have been investigated, they could, without exception, be traced to pilgrims or travellers along pilgrim routes. In some of the latest reports of the Sanitary Commissioners with the Indian Government it is held presumable that, owing to climatic conditions, outbreaks traced to pilgrims might have occurred irrespective of pilgrim influences. On the other hand, it is as probable that they would not have happened; or if so, in a much less degree of severity, and with a considerably lower mortality. So inseparably, does it appear from personal observation, are cholera and pilgrimages connected, that in order to prevent the former it is necessary to prevent the latter. So long as pilgrimages are tolerated, or considered so essential by the Indian native community from a religious point of view, so long will the death-rate from cholera remain high, and that, too, in spite of climatic or other conditions.

Incubative Period of Cholera.—We have already discussed this point in connection with some cases cited to show the evil results of human intercommunication. The evidence went to show that, in could be traced, was under forty-eight hours. The following cases lend support to the opinion :—

(1) Uchab Dolai, was employed at a salt factory at a village called Tua, situated on the banks of the Chilka Lake, in the district of Puri. He left Tua on the morning of 13th June to go and purchase rice at his native village, at which he arrived about noon. Twelve or fifteen persons had died from cholera in this village during the previous fortnight. He set out on his return journey early on the morning of the 15th so as to resume his work at the usual hour (6 or 7 A.M.). While at his native village he obtained his drinking water from a tank in which the clothes of cholera patients had been washed. (I would mention here that there are no wells in this part of the district, the inhabitants depending entirely upon rain-water collected in tanks, which are usually fouled to the highest possible extent). While at work on the 15th he was attacked with cholera at mid-day, and died at night. There was no case of cholera in Tua previously, and as the clothes of the deceased were burned under the order of the Salt Department, and in the presence of the hospital assistant, and other precautions taken, the disease did not spread in the village.

(2) There was a death from cholera in the village of Chuty Polung. On the day of the Saradh ceremony of the deceased, Kalia Pandah, of another village 2 miles distant, was present, and ate parched rice and curd. He was attacked with cholera the following day (2nd January) and died on the 3rd. His sister-in-law was attacked on the 5th, and died on the 6th. A girl, aged, 8 years, was attacked on the 6th, and died on the 8th. A fourth person was attacked on the 7th, and recovered. Other two cases occurred. The outbreak in Chuty Polung was traced to another village 1 mile distant.

In my whole experience I have not come across a case in which there was a single fact pointing to a longer period than three days after importation of the disease, and in the great majority of cases in which there is a definite history the period appears to be well under three days. Bristowe says :—"The duration of the incubative stage of cholera is not certainly known. It probably varies, generally between a few hours and three days." The Vienna delegates affirmed their belief that the period of incubation of the disease did not last beyond a few days. Dr. Macnamara gives details of some cases bearing on the question in the *Indian Medical Gazette* for March, 1872. He gives an account of a local epidemic in Calcutta, in which six persons were attacked by cholera within forty-eight hours after exposure to the disease germs.

Parkes, in his book on *Practical Hygiene*, says:—"Then as the incubative stage can certainly last for ten or twelve days, and there are some good cases on record where it has lasted for more than twenty, it is clear that quarantine, unless enforced for at least the last period of time, may be useless.

I have exhausted a very large amount of literature on the subject; and where I find numerous instances in which the period of incubation does not appear to have been more than forty-eight hours, I have failed to discover one in which there was a probability of its extending to such an extraordinary length of time. I have only to state that if such instances have occurred, some important details in the history have been accidentally omitted or kept back. We have only to consider the fact that the great majority of the natives of India are absolutely ignorant of the danger of carrying about clothing, soiled with choleraic dejecta, in order to arrive at the probable explanation of such indefinitely long periods of incubation. If every bundle belonging to this class of people was carefully examined during epidemic outbreaks of cholera, I venture to believe that in every company would be found a portion of clothing formerly worn by a deceased relative or friend. I have myself caused bundles to be opened, the stench from which was sickening. On the other hand, I have never yet known a native of the country to confess that he possessed such an article. The truth can only be elicited by personal inspection of their possessions. When we consider, therefore, the innumerable ways in which infective material can be carried about, we are not astonished that the disease may only appear at long intervals after what might be regarded as the only possible time and

Direct communication of the disease.—During the past two years I have only known three instances in which it is probable that the disease was communicated to healthy individuals directly. A father attended his son who was under treatment in the Cholera Hospital at Puri. The son recovered. The father was attacked and died. A sweeper girl was employed in the town assisting her mother to cleanse latrines during a cholera epidemic. She was attacked with the disease and died. A sweeper was employed cremating the bodies of those dead from cholera. He was attacked with the disease and died. He attributed the disease to the fact that kerosine oil had accidentally got into his rice *(sic).* Wherever discipline can be enforced, and cleanliness and disinfection insisted upon as in Puri Municipal and Government Hospitals, such occurrences are rare. During the years 1893 and 1894, 21 different persons were employed attending cholera cases in the Puri Jail. With one exception, a prisoner who had attended his brother, but who himself had been exposed to the risk of contracting the disease outside the jail, they all escaped. During the same years 1 civil surgeon, 2 assistant surgeons, 5 different Civil Hospital assistants, 1 compounder, 1 assistant health officer, 1 conservancy inspector, 1 municipal overseer, 8 police constables, 4 bearers supplying food to the sick, 28 coolie bearers conveying the sick to, and the dead from, the cholera hospital, 10 coolies employed cremating the dead, and 10 mehters for removing cholera dejecta from the hospital wards were engaged during epidemics, and, with the exception of one of the coolies employed cremating the dead, who was attacked and died, none of them suffered from the disease. Not one of the establishments in any of the different district hospitals in which cholera cases were treated showed any symptoms of the disease; and out of 382 sweepers employed by the municipality cleansing latrines only one was attacked—the girl referred to above, who assisted her mother. The only reason which can be assigned for their remarkable escape is that they scrape up the night soil with ladles made of cocoa-nut shells, to which handles are attached, and thus avoid handling the dejecta. They are, moreover, exceedingly careful about washing their hands and bodies before partaking of food.

Instances have been recorded, in order to show that the atmosphere is a possible means of spreading the disease, but as most of the cases cited happened fifty years ago, when less was known about the disease and its contagious properties, or how the contagion spread, they must be accepted with a certain amount of caution. Fear of contracting the disease may give rise to symptoms of a choleraic nature. The acting chaplain of Cuttack, a fresh arrival in India, visited the Puri Cholera Hospital at a time when it was full of patients. He stood with his back towards the building and his face towards the sea, which clearly showed that he did not feel quite at home. In the evening he had diarrhœa and vomiting, which lasted the whole night and part of next day, after which no other symptom manifested itself. It may be safely assumed, I think, that the disease is not at all communicable through the atmosphere, or, if so, to a very inappreciable extent. The atmosphere of cholera hospitals or sheds may smell to an unbearable extent, and yet not give rise to cholera amongst attendants on the sick, who not only live in, but sleep in them.

Meteorology.—No two years could have presented such marked differences in the amount of rainfall and its distribution throughout the different months of the year, or such marked differences in temperature in those months when cholera attained its maximum degree of intensity. Eighteen deaths from cholera were registered in the town from 1st January to 30th June, 1893. One case occurred in each of the months April, May, and June. 115 deaths from this cause were registered in the district during the same period of that year.

Rain fell on two days in January (2·18 in.), on five days in February (3·09 in.), on four days in March (1·05 in.), two days in April (0·07 in.), on eight days in May (21·68 in.), and on ten days in June (2·38 in.).

The total rainfall during the first six months of the year 1893 was 30·45 inches.

Nineteen deaths from cholera were registered from 1st January none fell in February, and none in March, during which month however, 10 cases of cholera were reported. Rain fell on two days in April (0·72 in.). None fell in May. Rain fell on fourteen days in June (4·93 in.), of which 3·33 inches fell between the 19th and the 30th.

During the first six months of the year 1894 the total rainfall was only 5·80 in. In July, 1893, rain fell on ten days (3·58 in.), and in July, 1894, on twenty-one days (12·10 in.). In 1893 cholera broke out in epidemic form on 13th July, and in 1894 on 2nd July. 174 deaths occurred from cholera during July, 1893, and 124 in July, 1894, the epidemic occurring in both years during the assemblage of pilgrims at the time of the Car Festival, and continuing in 1893 till 7th August, and in 1894 till 13th August. It is worthy of note that although the death-rate in 1893 was higher in number, it was vastly less than in 1894, when we regard the fact that the number of pilgrims assembled was infinitely greater in the former than in the latter year. The fortunate result was attributed to the abundance of rain distributed, as it was, in liberal amount throughout the preceding months of the year 1893, an opinion which was supported by the fact that on 7th August, after a long period of comparatively small rainfall and excessively high temperature, seven cases of cholera were reported, being the highest number on any single day during the epidemic. On the same day 0·78 in. of rain, and on the 8th 3·34 in., were collected. No case occurred thereafter, although no rain fell and the temperature continued high, till 23rd August, when a suspected case occurred near the Port Officer's residence. As the patient, however, was going about as usual next day, it was returned as a case of choleraic diarrhœa. Atmospheric conditions, judging from former experience, was clearly favourable to another outbreak, and it was considered that a fall of 2·87 in. on the same day prevented such an occurrence. After 21st August only 8 cases of cholera occurred during the year. In September, 18·82 in. of rain, in October, 8·32 in., and in November, 0·20 in. were collected. No rain fell in December.

It appears, therefore, that during the year 1893 the rainfall tended to check the dissemination of the duration of epidemic outbreaks. The disease prevailed chiefly during periods of scanty rainfall, accompanied with a high temperature of the atmosphere.

It would seem that the rainfall had a precisely opposite effect, and that the temperature of the atmosphere did not enter, to any appreciable degree, into the causation of the two epidemics which occurred during the year 1894. Practically, no rain fell during the first five months of the year 1894, and yet, during that period, only 19 deaths from cholera occurred in the town, against 17 during the corresponding months with an excessive rainfall in 1893. Out of a total rainfall of 5·80 in. during the first six months of 1894, not less than 3·33 in. fell towards the end of June. The temperature, from 10th to 18th February, varied between 83·7° F. and 93·3° F. One case of cholera occurred on 16th February (temperature, 85·8°); and another case on the 18th (93·3°). Three cases occurred on the 28th (89·2°); one case occurred on 1st March (85·8°); two cases on the 9th (92·9°); two cases on the 14th (87·4°); two cases on the 15th (85·9°); one case on the 16th (86·3°); one case on the 20th (88·0°); one case on 4th April (90·0°); and one on the 5th (89·4°).

In February and March the disease appeared to follow foggy, dark, gloomy, and cloudy weather.

No case of cholera was reported after 5th April till 29th May, although the temperature continued unusually high, except on 19th, when it dropped 4° after a thunderstorm, and a fall of 0·70 in. of rain on the 18th. Indeed, the temperature on 30th April was 94·8°, and on 14th May up to 95·6°, and continued over 90° till 9th June, when it fell slightly after a shower of rain. On 22nd June the temperature was 93·4°, but fell to 86·4° after a fall of 1·62 in. of rain. On 29th June rain fell continuously for twelve hours, and 0·92 in. was collected. On 30th, 0·12 in. was registered.

During the greater part of June it was either a duststorm, sultry or dark gloomy weather, passing showers, and towards the end of the month, thunder and lightning at a distance, and heavy rain. Cholera, however, did not occur in the town during the month of June.

fill up from rise of subsoil water level. On 3rd July the first batch of pilgrims for the Car Festival arrived in the town, having passed through the storms of the latter portion of June, and endured the ordinary hardships of the journey, intensified by the state of the weather, and seven were reported straight off to be suffering from cholera.

During the month of July rain fell on twenty-two days out of the thirty-one. The temperature, except during two days (on 10th, 91·4°, and on 11th, 91·4°), was well under 90° during the whole of the month. From 19th June to 31st July 15·41 in. of rain were collected, of which 12·10 in. fell in July. The disease began to abate, it would appear, simultaneously with a decrease in the rainfall, for, from 1st to 13th August, after which no cases occurred, only 2·62 in. fell. The temperature during July and August showed no marked difference. In fact, August was the hotter month of the two, day for day, and neither of them was anything like as hot as May, when only one case occurred, or June, when no case occurred. It is reasonable, therefore, to suppose that the temperature could not, in itself, have played an important part in the causation of the epidemic, while, on the other hand, the opposite seem to hold good with regard to the rainfall. The epidemic ceased, I have already said, on 13th August, from which date till the 31st, 2·49 in. of rain fell. In September no rain fell on fifteen different days; on other five days only 0·36 in. fell. On the 1st, 7th, 8th, 15th, 24th, 25th, 26th, 27th, and 28th of September respectively, 0·60, 0·59, 1·37, 1·64 0·57, 0·89, 0·22, 0·51, and 0·52 in. of rain were registered respectively. On 1st and 2nd October no rain fell. 1·39 in. were collected, on the 3rd; 0·11 on the 4th; 0·07 on the 6th, when one case of cholera was reported; and 3·88 in. were registered on the 7th, when seven cases occurred. Although the temperature was excessively high in September, no case of cholera occurred, again, apparently, lending support to the belief that high temperature in itself is not sufficient to cause epidemics of cholera.

The heavy fall of 3·88 in. of rain on 6th October occurred at a time when pilgrims were again on the march to Puri. 13·32 in. fell during the month, of which on eight days none fell.

The second epidemic of cholera lasted from 6th October to 28th November. It began, however, to abate on 16th November, six days after cessation of rain, and only 9 cases were reported from 16th to 28th, after which date no rain fell. It is to be noted that the town and district of Puri were practically pilgrimless, and there were no fresh arrivals. Only one case occurred during the rest of the year—viz., on 5th December. As, however, this was a death reported by the police, and no history was obtainable, it may be assumed that the case was one of either dysentery or diarrhœa, as all such cases are invariably placed in the same category as cholera by this uneducated body of registrars. From a consideration of the foregoing observations, it becomes evident that, whatever part meteorological conditions play in the causation of cholera epidemics, or otherwise influencing them, pilgrimages, in themselves, are responsible to a very large extent, and I shall endeavour, under the following heading, to shew in what way it appears probable that cholera and pilgrimages are so closely associated with each other. I have already shewn that they are almost inseparable, but have not ventured to express an opinion as to why that is so.

Etiology of the disease.—It would be merely an attempt at hair-splitting to dispute the contagious properties of choleraic discharges, or that water and food are the principal vehicles by which the poison is introduced into the alimentary system, in face of the vast amount of evidence which has been collected to prove that such is the case. Whether the comma bacillus is the essential agent in the production of the disease has been subjected to a great deal of discussion by distinguished bacteriologists, a few of whom still oppose the theory. Whatever may ultimately be demonstrated to be beyond question the specific cause, it cannot be denied that cases occasionally crop up in which it is difficult to believe that any specific virus could have been the prime causative agent. The histories of all cases which I have investigated during the past two years go to shew the intimate connection with unwholesome food consumed by the patient. The fact that the great majority of cases occur during the night or very early in the morning seems, at a first glance, to lend support to the theory, and such a belief is strongly rooted in the minds of the native popuassistants, and that more highly educated class of medical officers—assistant surgeons—entertain such a notion, and in reports submitted by them, food receives a prominent and water a very undignified position in the etiology of the disease. During long marches, especially in wet weather, pilgrims subsist on parched rice, raw vegetables, unripe or over-ripe fruit, sweetmeats of every conceivable variety, containing a liberal admixture of fat, which they consume in large amount. Other cases occur which shew a period of starvation, followed by gormandising bad food bought at the lowest possible price and proving fatal, accompanied with symptoms, between which and those of true cholera, whose diagnostic feature is supposed to be the presence of the comma bacillus, the line of demarcation would be a very fine one indeed. In the absence of a bacteriological examination it could not, of course, be positively asserted that the causative agent is not the comma bacillus. Nevertheless, the circumstances under which such cases occur are so strikingly peculiar and mysterious that one might almost positively affirm that this organism could not possibly have entered into their causation. These cases, relegated to the category of ptomaine poisoning, are almost as deadly as cholera, used in its main meaning, although, perhaps, not equally, if at all, contagious. It has been shewn by bacteriologists of great repute that there does not exist one specific comma bacillus, but that certain distinct forms, subjected to numerous conditions of cultivation for years together, continue to shew marked differences, and that no common average form has ever been attained. Moreover, they dispute, on scientific grounds, that all the distinct forms of comma bacilli are mere varieties of one species. They further dispute that cholera can be ascribed to the action of such organisms existing in the alimentary canal in cases of the disease seeing that cases occur in which there is no evidence of the presence of comma bacilli of any kind. The same authorities believe that, if cholera can be caused by any such organisms growing in the intestinal tract, these have yet to be found, and state that there are many facts suggesting that the comma bacilli are the consequence and not the cause of the disease, but grant that even if the consequence they may give rise to products which may become absorbed when the active condition of the intestine is re-established, and thereby affect the ultimate course of the disease.[1]

The cases which I have referred to, as belonging in all probability to the category of ptomaine poisoning, belong to the class in which such authorities maintain that there is no evidence of the presence of comma bacilli. Doubts on points of this nature can only be removed by an exhaustive bacteriological examination during severe and extensive outbreaks, and in all cases which occur in sporadic form at what may be regarded as seasons unfavourable to the growth of the germs. It is clear that in a district such as Puri there is a wide field for investigation, and the only apology I can offer for not having availed myself of the opportunity is the multiplicity of other important duties and want of suitable equipment. With this apology for shortcomings, and consoling myself with the thought that the subject is receiving the attention it deserves at the hands of competent observers, I shall proceed to state what has struck me as probable factors in the causation and dissemination of cholera, leaving it to such observers to settle moot points.

In some villages in the district of Puri there are no wells. The village tank is used for all purposes, and it is a singular fact that not only are such villages most severely attacked, but ever since they had an existence cholera has seldom or never been absent from them. In every other place in India where tanks afford the only water supply, the same state of matters exists, and pilgrims and residenters in the villages using the water thereof are equally attacked. Such is not the case where well-water is provided and used by the people. Village tanks, without exception, are so foul, that where well-water can be obtained for drinking purposes, tanks are reserved for bathing and washing clothes. Pilgrims, as a rule, are absolutely indifferent to the nature of the water they drink when hot and thirsty, rush for the nearest supply they can find, and consider it sufficient to cast aside the scum of filth that may have formed on the surface of the water contained in the tank, pool, or ditch from which they elect to drink. Villagers in most instances, even for the cleansing of their teeth and tongue, draw water from the village wells, but a few are not so particular, and resort to the use of tank water for that purpose. The idea of germs of disease clinging to their teeth, tongue, or palate is foreign to their nature. Those members of such communities who do not use the wells, but show a preference for tanks, are the chief sufferers during village epidemics of cholera.

Some factors which may possibly increase the virulence of cholera epidemics, though not perhaps sufficient to cause the disease.—No rain has fallen in the town of Puri, and little or none in any part of the district since 28th November, the date on which the last epidemic outbreak stopped, or up to 5th February, a period of over seventy days, and, as far as it is possible to form an opinion, very similar results to those of the two previous years, 1893 and 1894, may be anticipated. At the present moment, and for some weeks back, roadside ditches have been completely dried up, while the water of wells and tanks have been at a very low level. In fact, some of the wells, twenty feet deep, contain only a few inches of water. Pilgrims have been coming and going, in unusually large numbers, from the remotest corners of India, and yet not a single case of cholera has occurred amongst them, either on the road, as far as I can discover, and, for a certainty, none have occurred amongst them in the town. It may be presumed that the germs which were introduced into the water of wells, tanks, and ditches during the epidemic in October and November of 1894 have died a natural death, or exist in a half-dead and half-alive state, ready to spring into activity under revivifying influences, which are not present at this season of the year. That the onset of the rains cannot be regarded as the revivifying agent is clear, because in the first six months of 1893 and 1894 respectively, the conditions of rainfall were, as already mentioned, diametrically opposite so far as amount and distribution were concerned, and yet cholera did not occur in either of those periods in epidemic form. In both years, however, cholera did occur in epidemic form during the Car Festival season, at which time roadside ditches contained rain-water. The amount of water in the ditches during 1893 was considerably greater than during 1894, and cholera was accompanied marked difference in the pilgrim population of the two years is considered, the death-rate was very considerably less. Neither pilgrims nor natives of any district defæcate directly into wells or tanks. As a matter of necessity, no choice being afforded them owing to custom, except in the alternative of carrying a sufficient amount of water in their brass utensils for the purpose, which, however, is an exception to the rule, natives defæcate wherever there is a handy supply of water for ablution purposes after the act of defæcation has been performed. In this way roadsides are literally converted into continuous latrines during rainy seasons, and the very nature of the roads affords the greatest possible facility to both solid and liquid excreta being washed into the water contained in the ditches, the contents of which pilgrims drink with as much relish as the purest water. The level of the subsoil water can only, in my opinion, when it rises to the extent of forming pools and filling ditches, form a source of danger. In some parts of the district the disease chiefly prevails during the filling up of tanks after a period of drought, which might be explained by the theory that the germs of the disease are washed out of the soil by the rise of the water level.

The objectionable habit of the natives of India of defæcating near or on the margins and sides of tanks and ditches is, I believe, the root of the evil, and I have already pointed out that, in those villages which depend entirely upon tanks for drinking and all domestic purposes, cholera is an abiding disease. It is a striking fact that in municipal towns where tanks and wells can be protected to a large extent against pollution, and where ditch water does not present a temptation to hot and thirsty pilgrims, the disease can be checked to a remarkable degree. It is still more striking, however, that where precautions have been taken to prevent pollution of tanks and wells in district villages, in first cases, by the wholesale destruction of soiled clothing and the disinfection of the first affected houses, the disease has been checked in the bud. Whatever may be said regarding the etiology of cholera in other districts of Bengal, I have come to the conclusion that in Puri it is due to neither more nor less than the matter which either enter directly or are washed into the water contained in tanks, pools, and ditches, and that the intensity of epidemics of the disease depends upon the quantity of water contained in them, and the degree of concentration of such refuse. It cannot be denied that cholera discharges are contagious, but in face of the wide difference of opinion entertained by authorities on bacteriology as to whether the comma bacillus is the essential and specific cause or a mere manifestation of the disease, it may not be considered unscientific to venture to suggest the possibility, pending further light being thrown on the subject, that errors in diet and the drinking of water fouled in the manner already described, apart from the discharges of cholera patients, may be sufficient to bring about a series of symptoms identical with those cases in which bacteriologists have proved the presence of such bacilli.

Treatment of Cholera.—Almost every remedy that has been recommended for the treatment of this disease has been tried and found of no avail, in so far as cholera hospitals in this district are concerned, due to the fact that the great majority of patients are pilgrims admitted in the last stage of the disease. The few recoveries which take place amongst this unfortunate class of people must, I am afraid, be ascribed to good fortune, or their greater resistive powers, and not to medicines. It is only in cases which come under early notice, as amongst prisoners in jail, that any merit can reasonably be ascribed to drugs for general treatment; and it will be sufficient, therefore, to mention the treatment adopted and its results in cases which occurred in the Puri Jail during the past year. It may be at once stated that castor oil is excluded from the list of drugs employed, and that sulphuric acid and opium are invariably prescribed in the first stage of the disease.

On 25th July, Bhinoid Bhoi was received from court with ten other prisoners. One of their number was attacked with cholera at the court and died the same evening. Bhinoid Bhoi, on his return, had two loose, choleraic stools. A dose of sulphuric acid (25 minims) and of laudanum (10 minims) was administered, and sago

On 26th July, Daitara Oja, another of the company, had loose stools at 7·30 A.M., 9 A.M., 1 P.M., and 5 P.M. He was treated similarly. On the night of the 27th he had three motions, on the 28th two, on 29th none. He had no more symptoms after that.

On 28th, Bhaji Pandah was attacked, and put under the same treatment. Mustard poultices and stimulants were used in the course of the disease. He died on the 29th.

On 29th, Krupa Mullik, another of the same company, informed the Civil Hospital assistant at 11 A.M. that he had one loose stool at 8 A.M., and had pain in his belly. Was treated in the same way as the other three. Mustard plasters were applied to the abdomen, aromatic spirits of ammonia and ether were administered in the afternoon. On the 30th laudanum was stopped and sulphuric acid continued. The symptoms abated. On the 1st August he was out of danger, and ultimately recovered.

On 1st August, 1894, Dina Mullik, who had been attending his brother, had one loose stool at 5 A.M. The same treatment was adopted. He also recovered.

During the year 1894 eight prisoners suffered from cholera in Puri Jail, of whom five recovered, the death-rate being only 37·5 per cent. Of those who died, one had suffered for a whole day previous to his admission into jail, to which he was brought in a cart. Another, a female prisoner aged forty, died in the stage of reaction of pneumonia. Her state of health previous to the attack handicapped her chances of recovery considerably.

Cholera is, we believe, amenable to treatment in the earliest stage of the disease, and the success which has attended the administration of astringent remedies in the form of sulphuric acid and opium to begin with, and the careful avoidance of the latter in the more advanced stages of the disease, coupled with stimulants in the stage approaching collapse, the administration of nourishment at the proper time, in suitable amount and quality, warrants us in

GENERAL CONCLUSIONS DERIVED FROM THE FOREGOING OBSERVATIONS.

1. That pilgrimages and human intercommunication generally are most powerful factors in the dissemination of cholera.

2. That pilgrimages and cholera are almost inseparably connected, and that the disease confines itself for the most part to pilgrim routes.

3. That water is, undoubtedly, the chief vehicle through which the germs of the disease are introduced into the human system.

4. That the disease, if at all communicable through the atmosphere, can only be so communicated to an almost inappreciable extent, judging from the fact that the atmosphere, in badly ventilated sheds and hospitals, overcrowded with patients, during epidemics in Puri, has been excessively vitiated, and yet has not been sufficient to cause a general outbreak amongst attendants on the sick.

5. That when attendants on the sick are attacked the unfortunate occurrence must be ascribed to negligence with regard to cleanliness and disinfection of the hands before partaking of food.

6. That the dissemination of the disease can be prevented by suitable precautions.

7. That the period of incubation is, in the majority of cases, probably in all, well under three days, from the actual time of ingesting the virus.

8. That quarantine, during pilgrimages, is impracticable and dangerous; but that isolation is one of the most important preventive measures.

9. And, lastly, that the disease, in its incipient stage, is amenable to treatment in most instances.

THE CLAIMS OF HYGIENE

IN

SCHOOL AND UNIVERSITY EDUCATION

IN INDIA.

BY

JOHN MURDOCH, LL.D.,

Compiler of *The Way to Health,* a Sanitary Primer, sanctioned by the
Supreme Government for use in Elementary Schools.

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APPEAL

TO

THE INDIAN GOVERNMENTS,
THE DIRECTORS OF PUBLIC INSTRUCTION

AND

THE UNIVERSITY AUTHORITIES:

ON BEHALF OF

THE DUMB MILLIONS OF INDIA,
THE VICTIMS OF INDESCRIBABLE MISERY,
AND WHOSE DEATH-ROLL IS DOUBLED
FROM A VIOLATION OF
THE LAWS OF HEALTH.

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THE CLAIMS OF HYGIENE

IN

SCHOOL AND UNIVERSITY EDUCATION.

"WHAT KNOWLEDGE IS OF MOST WORTH?"

Herbert Spencer, in his Essay bearing the above title, shows that, in order of time, decoration precedes dress :

> "Humboldt tells us that an Orinoco Indian, though quite regardless of bodily comfort, will yet labour for a fortnight to purchase pigment wherewith to make himself admired. Voyagers uniformly find that coloured beads and trinkets are much more prized by wild tribes than are calicoes or broad cloths."
>
> "It is not a little curious that the like relations hold with the mind. Among mental as among bodily acquisitions, the ornamental comes before the useful. Not only in times past, but almost as much in our own era, that knowledge which conduces to personal well-being has been postponed to that which brings applause. In the Greek schools, music, poetry, rhetoric, and a philosophy which, until Socrates taught, had but little bearing upon action, were the dominant subjects ; while knowledge aiding the arts of life had a very subordinate place. And in our own universities and schools at the present moment the like antithesis holds. Men dress their children's minds as they do their bodies in the prevailing fashion. As the Orinoco Indian puts on his paint before leaving his hut, not with a view to any direct benefit, but because he would be ashamed to be seen without it ; so a boy's drilling in Latin and Greek is insisted on, not because of their intrinsic value, but that he may not be disgraced by being found ignorant of them—that he may have 'the education of a gentleman'—the badge marking a certain social position and bringing a consequent respect."

In India, for about half a century, literature and mathematics constituted nearly the sum total of the teaching in Government Colleges. This was but natural. The stream cannot be expected to rise higher than its source. Most of the professors were Oxford or Cambridge graduates, and sought to impart to the youth of India such an education as they had themselves received. Some modifications were necessary. English literature was substituted for that of Greece and Rome.

The late Viscount Sherbrooke was a distinguished Oxford graduate, a fellow of a College, and "obtained the reputation of being one of the best private tutors in the University."* He had therefore good opportunities for acquiring a knowledge of the state of education at Oxford. In an address delivered at Edinburgh in 1867 :—

"I will now give you a catalogue of things which a highly-educated man—one who may have received the best education at the highest public schools, or at Oxford—may be in total ignorance of. He will probably know nothing of the anatomy of his own body. He will not have the slightest idea of the difference between the arteries and the veins, and he may not know whether the spleen is placed on the right or the left side of his spine. He may have no knowledge of the simplest truths of physics, or would not be able to explain the barometer or thermometer. He knows nothing of the simplest laws of animal or vegetable life." "With the new world which chemistry is expanding before us—with the old world that geology has called again into existence—with the wonderful generalization with regard to plants and animals, and all those noble studies and speculations which are the glory and distinction and life-blood of the time in which we live, our youth remain, almost without exception, totally ignorant." pp. 25, 26.

A very similar state of things existed in India until a very recent period.

Many years ago the Bengal Council of Education remarked :—

"The want of every thing of a practical character in the educational course at present appears to the Council to be its greatest defect. Every thing that strikes the senses, one-half of the whole circle of knowledge is, as it were, ignored in our present scheme of education. This, the Council incline to think, would be a grave defect in any country, but they cannot doubt it is so in India."

In 1853, Sir George Campbell observed :—

"With respect to the quality of Government education, the great mistake seems to be the preference of English literature to science."*

In the Bengal Public Instruction Report for 1856-57, Mr. Hodgson Pratt, then Inspector of Schools, says :—

"We have so long given exclusive importance to Classics and Mathematics, that the young Baboos regard the Physical Sciences with contempt. There could not be stronger evidence of the defects of our past system. If there is one thing more than another which (religion apart) educationists ought to strive for in this country, it is to awaken these 'books in chudders,' as they have been wisely and wittily called, to the 'pleasures and advantages of Science.' To encourage them to pursue Classics and Mathematics to the exclusion of every thing else, is to perpetuate the very faults which especially distinguish the mental character of the so-called educated classes.

"I know that all suggestions of this kind are met by a cry, that we are going to substitute a smattering of every thing for a knowledge of two or three things; but it is worth enquiring whether we have not been teaching many things of little or no use whatever. I would ask why should Greeshchunder Chukerbutty be expected to know 'what circumstances enabled Shakespere to exhibit an accurate knowledge of Greek Mythology,' or 'in what respect the Dramatic compositions called 'Mysteries' differ from those called 'Moralities,' and other facts of a like nature? On the other hand, it is of very great importance, that he should see clearly the danger of living with an open sewer running under the lower floor of his house, or the cruelty of marrying his children at an immature age, or the impolicy of exhausting the soil of his fields by the disregard of important principles in Chemistry: and it is very important that his mind should comprehend the sublimity and beauty of the laws by which his own body and every thing around him are governed; and that his heart should, if possible, be awakened to the great facts and conclusions of Natural Theology."*

Professor Max Müller, in 1871, said that "the educational system now in force in India, with certain indispensible modifications, has been framed after the model of the Schools and Universities of England."†

"A Plea for Physical Science in our Schools and Universities" had to appear in the *Madras Mail,* of March 4th, 1874. Some preceding extracts are corroborated by the following:—

"A man may become a Master of Arts in Madras without knowing why an apple falls to the ground, where rain comes from, what is the meaning of a burning stick, why he has to breathe constantly, or what the sun means by occasionally disappearing at inconvenient times. Our opinion then, is that the Madras standard of liberal education is defective. We do not wish to exalt Physical Science at the expense of the other branches of education, but we think that to ignore it practically altogether is an evil. We think it particularly an evil in India, the native of which has never shown any active curiosity about the material world. It is to him a world managed and mismanaged by gods and devils, and he is quite content to let it remain so. He is essentially superstitious and his present education has little tendency to release him from that condition."

"If we look at education from the utilitarian point of view, the physical sciences, coupled with some knowledge of mathematics, are the most important subjects of study for a nation to encourage. There is no doubt that the material prospects of nations depend upon their attitude towards those branches of education which teach how to make the most of their resources."

The gradual introduction of Physical Science into the University courses will afterwards be noticed.

NEED OF A KNOWLEDGE OF HYGIENE IN INDIA.

Dr. Thomson thus describes a typical village in North India:

"Let us consider the circumstances under which thousands, aye millions! of agriculturists live and die in this country. The village is probably closely built on a site saturated with the impurities produced by previous generations. Very likely a jheel or large tank, fertile source of malaria, is close by. Our villager neither understands nor cares for conservancy. He is accustomed to make water in the most convenient spot that is not actually under observation; very likely a ruined compound or hut in the middle of the village. Refuse of all kinds, filthy water, decaying vegetation, and the excreta of animals, lie round his very door; nay, if the household be thrifty, the latter substance even ornaments his walls while drying in the sun for fuel. He performs his natural functions in the neighbouring field, where the excreta lying exposed, pollute the air which will pass, thus poisoned, over the village, and into the lungs of its inhabitants; carrying with it, it may be, the poison of typhoid or cholera. Butchers slaughter, and tanners ply their trade in any spot they choose, stagnant and foul water lies in holes until it finds its way into a well and pollutes the water, the filth washed from dirty clothes or persons, sinks into the ground all round; bodies of animals lie rotting in the sun; while finally the dead are too often buried in shallow graves, or imperfectly burned, near the village. All these things, and many others which will suggest themselves to my readers either poison the air above or the soil beneath; and as this soil is charged with air and moisture constantly rising from the ground, the danger is equal in both cases.

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* Bengal Public Instruction Report, 1856-57, Ap. A., pp. 2, 3.

"And if we examine his dwelling what do we find! Probably a small compound, in which the water lies; occupied by a bullock or some goats, and with an ill-smelling latrine in the corner. This compound surrounds the hut, and prevents the fresh air from freely blowing about the dwelling. The hut consists of mud walls with next to no arrangement for ventilation. A thatch, or 'chappa,' saturated with foul emanations, and the decaying remains of small animals, birds, and insects is over his head. In his mistaken ideas of cleanliness he has probably once a week or so 'leeped' (smeared) the floor, but has thereby only added new danger by using a certain amount of putrid matter in the form of cow-dung, and by making the floor damp. At night, the smoky flame of the lamp, adds its contribution to the general impurity, and not unfrequently the inhabitant increases his risk of imbibing poisonous gases by sleeping on the floor, or ensures it by wrapping up his head in a blanket, and breathing his own fouled breath over and over again.

"A village is spoken of, but can it be denied that most of these dangers exist in native towns and cities; and is there not, in a city, still greater danger when once cholera or other contagious disease has been originated or favoured by these conditions?"*

The *Indian Magazine* quotes the following regarding infant mortality in Calcutta:

"At a meeting of the Calcutta Corporation held on October 10th, one of the Commissioners (Babu Amalyadhan Addy) asked the following questions:—

" 1. Has the attention of the Health Officer been drawn to the fact that the death-rate of infants in Calcutta under one year of age was 402·4 per 1000 in 1894 ?

" 2. Will he please state the causes to which it is due, and suggest any steps that may be taken by the Commissioners for the reduction of the said rate of mortality ?

" The Chairman replied as follows :—

" 1. Yes. the Health Officer wrote the Annual Report for 1894. A death rate of 402 is not above the usual average. In 1894 it was 402 while in 1893 it was 415.

" 2. The cause to which the high infantile death rate is due is a want of knowledge on the part of parents as to the care of infants, and general sanitary conditions of the house." July 1896, p. 383.

A lurid light is thrown upon the above by the recent Report on the Sanitary Condition of Calcutta, from which the following is an extract :—

" In No. 17, DURPO NARAYAN TAGORE'S Street the houses are built almost back to back. It would nearly be impossible to squeeze between them ; sunlight is so far shut out that with broad daylight outside the gully, it is absolutely impossible to do more than grope your way from one part to another within these tenements ; rats run about here in the dark as they would at night ; a heavy sickening odour pervades the whole place ; walls and floors alike are damp with contamination from liquid sewage, which lies rotting, and for which there is no escape. From the gully between Nos. 21 and 22, Maharatta Street, ten cart-loads of offensive matters were removed ; this gully was so narrow, that it was impossible to walk straight down it, the coolies having very great difficulty in using their kodalies. Jammed in among these overcrowded huts are clusters of filthy, dilapidated privies, which are fouled beyond description with their drainage discharging into the little space that is left, and polluting everything. In many cases it is practically impossible to walk into the spaces between and behind the huts, where the ground is damp with liquid sewage, and the stench is simply overpowering."*

The Report shows that the strong language of the Lieutenant-Governor was fully justified.

With regard to Bombay, that plague-stricken city, no remarks are necessary. Its trumpet call waxes louder and louder, and should rouse the most lethargic.

The Decennial Statement gives the following figures as the average mortality from the principal diseases during the decade ending in 1891-92 (p. 370.)

Fevers	3,461,249
Cholera	351,707
Bowel Complaints	267,372
Small-pox	129,210

Madras and Birmingham have each somewhat the same population—about 450,000. The annual mortality is about 39 per thousand in the former, and 20 per thousand in the latter. This gives an annual mortality of 17,550 in the former, against 9,000 in the latter.

The Indian Tables of Mortality are notoriously imperfect. Sir H. S. Cunningham, in a paper read before the Society of Arts, January 27th 1888, says: "The real death-roll of India is probably nearer 7 millions or 8 millions than 5 millions."

The Army Sanitary Commission, reviewing the mortality for 1885, say:

"We learn from this table that 78 per cent of the entire registered mortality was due to mitigable or preventable disease." It is added that during the decade 1876-85, thirty-eight millions perished in India from fevers, cholera, bowel-complaints, and small-pox. Attention is also called to the fact that each of these deaths represents several cases of illness, amounting in the case of fever, to attacks several times over the entire population, and to the frightful waste and national poverty resulting from this mortality and disease.

INDIAN IGNORANCE OF SANITATION.

As a rule the people are totally ignorant of the true causes of disease and how to deal with an epidemic.

Two diseases are especially ascribed to demons or goddesses. One is cholera, rapid in its course, often fatal, and sometimes carrying off great numbers. In the South it is popularly supposed to be caused by one of the local mothers, as Mari-amman, Mother of Death, represented by the Brahmans to be forms of Kali. In the North a new goddess, called Ola Bibi, is thought to preside over cholera. . The small-pox goddess is worshipped under different names in every part of India. In the North she is called Sitala Devi, (she who cools) or simply Devi. Mari-amman is the usual name in the South. She is supposed to scatter the seeds of the disease for her amusement. When a person is stricken by small-pox, the expression the people use is, "the *amman* is taking her pastime over him." Many of the common people are afraid to get their children vaccinated, lest it should displease the goddess by interfering with her sport.

A common Hindu explanation for all cases of disease is that they are the fruit of sins in a former birth. If an infant die, it must have committed a great crime to have its existence so soon cut short. It is considered impossible to escape the results of

Muhammadans are fatalists like the Hindus. They ascribe sickness and death to the will of God, and regard resignation as their only duty.

Midnight processions, followed in some cases by the sacrifice of a buffalo to propitiate the goddess supposed to cause the disease, is the approved Hindu method of dealing with an epidemic. Exposure to the night air, loss of sleep, and fatigue, will evidently rather tend to increase the severity of the attack.

The Hindu, the leading Native journal in South India, thus describes the ignorance of the masses and their ideas with regard to the causes of disease:

> "The people are utterly ignorant of the most obvious requirements of healthy living. They are notoriously sceptical about the efficacy of European methods. The great mass of the people are merely provoked to laughter when you press on them the desirability of pure air fesh water, and wholesome food. The ways of their ancestors are the only proper ways to pursue in their judgment . . . . When thousands of their neighbours daily fall victims to one epidemic or another, they trace the disaster to some offended deity whom they propitiate by sacrifices and ceremonials and remain content. They are not conscious of the real causes which demand such dreadful homage from their ignorant victims. They do not know that these are mostly preventable, and that in most instances ordinary precautions would enable them to defy the monster and live healthily and happily." Feb. 27, 1888.

The most useful sanitary rules are regarded as mere freaks of their foreign rulers. A Madras poet sings:

"Sanitation is a botheration
To the Tamil Nation."

The regulations are even looked upon as cases of *zoolum* (oppression) of which the worst Hindu or Muhammadan governments were never guilty. Which of them found fault with stinking drains?

EDUCATION AS A MEANS OF DIFFUSING A KNOWLEDGE OF HYGIENE.

It is granted that there must be a combination of agencies to promote the health of the people of India. The Sanitary Department of Government is one of prime importance. The Police and Local Authorities may do much. Lectures and the circulation of tracts on sanitation will contribute towards the end in view. The object of the present Paper is to show the value of Education in this respect, not as a *substitute* for the others, but as *ancillary.*

1. Native public opinion must be enlightened to enable sanitary regulations to be carried out heartily, instead of being regarded as useless freaks, to be violated whenever it can be done

2. Education affords the means of reaching four millions, scattered all over the country, at an age, when most impressible. It has been well said: "**Whatever you would put into the life of a Nation, put into its Schools.**" Those under instruction will eventually become the leaders of society.

3. The cost to Government is *nil* or a mere trifle. Sanitary Inspectors are valuable; but an adequate staff would be very expensive. So with some other agencies.

4. What is proposed can be secured *at once* by Resolutions of the Indian Governments and University Authorities.

THE TEACHING OF HYGIENE IN SCHOOLS ENJOINED BY THE GOVERNMENT OF INDIA.

Its importance has been already recognized. About twenty years ago a prize was offered by the Supreme Government for the best *Sanitary Primer*. As none pleased Dr. D. Cunningham, Surgeon-General, he prepared one himself. Though ably written, it was found too difficult for young readers, and *The Way to Health*, a Sanitary Primer by the writer of this Paper, was, with a few omissions, substituted. It was made a compulsory subject in every Government school teaching Anglo-Vernacular Standard V.

At a later period a prize was offered for an advanced Text-Book on the subject. It seems to have been gained by one printed at Simla in 1892, entitled, *Text-Book of Sanitary Science for the use of Senior Students in English and Anglo-Vernacular Schools in India*. Royal Octavo, 190 pp. Price 1 Re.

SCHOOL INSTRUCTION IN HYGIENE MUCH NEGLECTED.

This is shown by its scanty recognition in the courses of study in the great Provinces of India.

Bengal.—This Province does not seem to have a general course of study.

N. W. Provinces and Oudh.—In Vernacular Schools, Cunningham's Sanitary Primer is included in two out of eight Standards. In Anglo-Vernacular Schools in two out of ten classes.

Punjab.—Sanitation is entirely ignored in the programmes of Lower Primary, Upper Primary, Zemindari, and Industrial Schools. It occurs in the Middle Standard Examination for Native Girls. In Anglo-Vernacular Schools Cunningham's Primer is put down for one class out of twelve classes.

Bombay.—In Marathi Primary Schools the Sanitary Primer is included only in the Sixth Standard; with the note appended, "The teaching of the Sanitary Primer is not compulsory in aided schools." In Anglo-Vernacular

Madras.—The Code of this Province is peculiar in recognising Hygiene as an optional subject from the 3rd to the 7th Standard. The grants for passes are fairly liberal, ranging from 8 As. to Rs. 4. Details regarding passes are available only for Primary Schools. The Public Instruction Report for 1894-5 (page 51) gives the respective numbers passed in Reading and Hygiene as follows:

		Reading.	*Hygiene.*
Infant Standard	...	56,402	
First Standard	...	76,476	
Second Standard	...	62,653	9
Third Standard	...	43,426	8297
Fourth Standard	...	15,439	8606
		254,396	16,912

It will be seen that rather less than 7 per cent. study the Sanitary Primer in Result Grant Schools. It is believed that the percentage is much smaller in Secondary Schools.

As will be shown hereafter, Hygiene is entirely ignored by the Indian Universities. Out of four million pupils it is believed that not more than five per cent receive any instruction in hygiene.

SCHOOL COURSE SUGGESTED.

Two points must be borne in mind:

1. The majority of the children do not reach the higher standards. It is a lamentable fact that some children do not get beyond even the *First* Book. It is very desirable that they should carry away with them a few simple sentences like the following:

Fever is often caused by bad water.
Vaccination keeps away small-pox.
Filth is the mother of sickness.
Cleanliness is the mother of health and long life.

If hygiene is taught only in the Fifth Standard, three-fourths of the pupils will not be benefited.

2. Every extra text-book is a difficulty. If the subject is one which the parents and children consider essential, it will be purchased; but what idea have they of the value of a Sanitary Primer?

To secure some instructions adapted to the capacities of the children, there should be a few lessons on the subject included in the *ordinary* Readers. If he has nothing else, every child has a *Reader*, so that all would be reached. There might be a series of lessons up to the Fourth Standard, after which the Sanitary Primer might be taken up, as prescribed by the Supreme Government, for the Fifth

It may be said that surely such lessons are included at present. Their almost total absence in Government School Books will be shown from the following examination.

In 1893 the writer obtained sets of all the English "Readers" published for Government Schools. They included the following:

North-West Provinces and Oudh.—Primer, Illustrated Readers I—IV. Reader No. VI.

Punjab.—Primer, Primary English Reader, First English Reader, Second English Reader, Third Reader for Middle Schools, Man and his Duties, a Moral Reader.

Bombay.—Primer, Second Book. Parts 1 and 2. Third Book.

Madras.—Readers I—V.

The examination was based on the foregoing 22 volumes. The Bengal Department of Public Instruction does not publish text-books. This is left to private enterprise.

Of the 22 Readers only *four* contained any lessons on health. Out of 1154 lessons in all, there were *seven* on health.*

To give a better idea of what is proposed, twelve graduated lessons for Standards I—IV. are appended, somewhat like those in the Readers of the Christian Literature Society.

By thus securing some knowledge of the subject to the pupils up to the Fifth Standard, probably 75 per cent. will be reached: The higher classes in Secondary Schools will be considered in connection with the Universities.

Science in the Indian Universities.

As already mentioned, for many years literature and mathematics, including history and geography, formed the sum total of the teaching in Indian Colleges. Bombay has the credit of being the first to introduce Physical Science as a compulsory subject, and this even in the Matriculation Examination.

The subjects for the Matriculation Examination in the three Indian Universities in 1871 were as follows:

Calcutta.	Madras.	Bombay.
i. English Language & Optional Language.	i. English Language.	i. English Language.
ii. History and Geography.	ii. Optional Language.	ii. Optional Language.
iii. Mathematics. (Four Books Euclid.)	iii. History & Geography.	iii. Mathematics. (Four Books Euclid.)
	iv. Mathematics. (Three Books Euclid.)	iv. (1) History and Geography. (2) Elementary Knowledge of (*a*) The Mechanical Powers. (*b*) The laws of Chemical combination, the chemistry of air and water, and the phenomena of com-

In the other Examinations only the Physical Science subjects will be noticed.

First Examination in Arts.

Calcutta.	Madras.	Bombay.
Optional.	*Nil.*	*Optional.*
Chemistry of the Metalloids		Chemical Physics.

B. A. Examination.

Calcutta.	Madras.	Bombay.
Compulsory.	*Optional.*	*Optional.*
Mechanics, Hydrostatics, &c. Astronomy.	One of the three following subjects. (*a*) Natural Philosophy. (*b*) Physical Science. (*c*) Logic and Mental Philosophy.	Any three of ten subjects, the half of which related to Physical Science.
Optional.		
A choice of several Subjects.		

The Table on the next page, giving the subjects from the University Calendars for 1896, will show the progress made during the last quarter of a century.

Omission of Hygiene.—While the advance made is cheerfully acknowledged, the remark of Spencer with regard to the preference of the ornamental to the useful holds good to some extent. The circumstances of India have not been sufficiently considered. The Education Commission condemned the use of Home English Reading Books in schools as not adapted to the country. The University Authorities seem to have followed the Home subjects apparently without considering whether they were those which Indian students most required to be taught. In a country the supposed birth-place of cholera and with an appalling death rate, Hygiene finds no place in any University Course. It is true that some have Physiology as an optional subject, but this does not by any means meet the case.

In the eyes both of teachers and pupils, subjects of instruction derive their importance in the proportion they conduce to success at University examinations. It is useless to prescribe Hygiene as an optional subject in Secondary Schools, because it is not included in the University Course. Make it one, and the lead is transmuted into gold. Students will then eagerly study the best means of promoting their own health—but not otherwise.

Most of the Indian Universities have two Science Subjects for the Matriculation Examination,—generally Physics and Chemistry. To be effectively taught, both require good apparatus, with which High Schools are, in general, not sufficiently provided. The students at that stage have also an insufficient knowledge of English for such subjects. They should be transferred to the First Arts Examination. Instead of them, let Hygiene and Physical Geography, including an outline of Astronomy, be substituted.

CALCUTTA.	MADRAS.	BOMBAY.	PUNJAB.	ALLAHABAD.
Matriculation Examination.				
Physical Geography.*	Physics and Chemistry.	Mechanics, Chemistry, Astronomy.	Elementary Physics and Chemistry.	Physical Geography.*
First Examination in Arts.				
Elementary Physics and Chemistry.	Physiology or Physiography.	Elementary Physics.	Physical Science. Any one of the following: 1. Physics and Chemistry. 2. Zoology, & Comparative Physiology. 3. Botany. 4. Geology.	Elementary Physics and Chemistry.
B. A. Degree Examination.				
Statics, Dynamics, Hydrostatics, Descriptive Astronomy. Optional in B Course. One of the following: Physics and Chemistry. Physiology and either Botany or Zoology. Geology and either Mineralogy or Physical Geography.	One of the following five Branches. 1. Mathematics and Natural Philosophy. 2. Physical Science. 3. Natural Science. 4. Mental and Moral Science. 5. History.	One of the following: (a) Language and Literature. (b) Logic and Moral Philosophy. (c) Mathematics. (d) Chemistry and Physics. (e) Natural Science. (f) Roman History, General Jurisprudence, Roman Law.	Any one of the following: 1. Physics. 2. Chemistry. 3. Zoology and Comparative Physiology. 4. Botany. 5. Geology.	Included under Mathematics: Statics, Dynamics, and Hydrostatics. B. Course. Mathematics and one of the following: Physics. Chemistry.

There is great ignorance among the people with regard to Natural Phenomena. *The Calcutta Review* says: "The Puranas maintain, that the clouds ascend one-third the height of Sumeru, or 200,000 miles high, and that they are full of small pores resembling sieves. Eight great elephants, called Dighastis, are said to sprinkle water on the clouds which falls in drops through their numerous pores." As is well known, eclipses are supposed to be caused by red and black monsters seeking to seize the sun and moon. The people generally are enslaved by astrological superstitions. Favourable seasons for sowing, &c., are sometimes lost from the position of the planets being supposed to be adverse.

TECHNOLOGY, including the industries most desirable to be developed in India, might well form a subject for the B. A. Examination. There is too much dependence upon agriculture, so that the misery caused by unfavourable seasons is thus intensified.

Sir H. S. Cunningham says of Hygiene:

> "Some acquaintance with the art of living in health ought to form a necessary part of every educational curriculum. The subject might surely form one branch among the many which the Universities recognise as worthy their notice. Such knowledge would, one is inclined to think, be as practically valuable to a young Hindu as the refinements of European literature or the hazy depths of metaphysics, to which he is now introduced by his instructors."

As already mentioned, there is a Text-Book on the subject, beginning with some elementary lessons on Physiology. Though good on the whole, it is too large, and some changes might be made with advantage. The appointment of the subject by the Universities would soon produce a satisfactory text-book.

It is proposed to move in the Senates of the different Universities that Hygiene be made a compulsory subject in the Matriculation Examination. It is hoped that this will meet with general and cordial support.

CONCLUDING APPEAL ON THE DUTY OF TEACHING HYGIENE.

The following parable of Huxley may be applied to a knowledge* of the Laws of Health:

> "*Suppose it were perfectly certain that the life and fortune of every one of us would, one day or other, depend upon winning or losing a game at chess. Don't you think that we should all consider it to be a primary duty to learn at least the names and moves of the pieces; to have a notion of a gambit, and a keen eye for all the means of giving and getting out of check? Do you not think that we should look with a disapproval amounting to scorn upon the father who*

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* *The Public Health in India*, p. 15

allowed his son, or the state which allowed its members, to grow up without knowing a pawn from a knight?

"Yet it is a very plain and elementary truth, that the life, the fortune, and the happiness of every one of us, and more or less, of those who are connected with us, do depend upon our knowing something of the rules of a game infinitely more difficult and complicated than chess. It is a game which has been played for untold ages, every man and woman of us being one of the two players in a game of his or her own. The chess-board is the world, the pieces are the phenomena of the universe, the rules of the game are what we call the laws of Nature. The player on the other side is hidden from us. We know that his play is always fair, just, and patient. But also we know, to our cost, that he never overlooks a mistake or makes the smallest allowance for ignorance. To the man who plays well, the highest stakes are paid, with that sort of overflowing generosity with which the strong shows delight in strength. And one who plays ill is checkmated—without haste, but without remorse. Ignorance is visited as sharply as wilful disobedience—incapacity meets with the same punishment as crime. Nature's discipline is not even a word and a blow, and the blow first; but the blow without the word."

*"Well, what I mean by Education is learning the rules of this mighty game."**

The people of India may be regarded as the children of the State who ought to be taught the rules of this mighty game, whose stakes are health or sickness, life or death. At present the provision in School Education is most inadequate; in the University Course it is entirely ignored.

The following measures are earnestly suggested:

1. That a few simple lessons on Hygiene be introduced in the Readers for Standards I—IV.
2. That the present Rule requiring a Sanitary Primer to be taught in the Fifth Standard be enforced.
3. That Hygiene form a compulsory subject in the University Matriculation Examination. This would secure its effective study in Secondary Schools.

Objections.—Some may say that it is useless to teach hygiene to the caste-bound and custom-bound people of India. It is granted that the process will be slow; but it will tell in the end. Spencer may furnish a reply:

> "Knowledge which subserves direct self-preservation by preventing loss of health, is of primary importance. We do not contend that possession of such knowledge would by any means wholly remedy the evil. For it is clear that in our present phase of civilization men's necessities often compel them to transgress. And it is further clear that, even in the absence of such compulsion, their inclinations would

frequently lead them, in spite of their knowledge, to sacrifice future good to present gratification. But we do contend that the right knowledge impressed in the right way would effect much; and we further contend that as the laws of health must be recognised before they can be fully conformed to, the imparting of such knowledge must precede a more rational living—come when that may."*

Whether the people obey or not the laws of health, it is the duty of Government to enforce their instruction. But there is no question that it would tell in the end. The people generally would come to understand the value of sanitary regulations, and in course of time every Government officer would be able to take an intelligent part in carrying them out.

And let there be no delay. The daily death-roll of India is about 16,000, in addition to many million cases of disease. No longer let it be said:

" **My people are destroyed for lack of Knowledge.**"

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* What Knowledge is of most worth ?

THE FOLLOWING GRADUATED LESSONS ON HEALTH, FOR STANDARDS I—IV., ARE PRINTED, BOTH TO GIVE A BETTER IDEA OF WHAT IS PROPOSED AND TO OBTAIN SUGGESTIONS FOR THEIR IMPROVEMENT.

FIRST STANDARD.

1. How to be Healthy.

If you wish to be healthy and strong, mind what I tell you. Fresh air is what we most need. Bad water often causes fever. Unripe fruit and raw gram should not be eaten. Keep your body and dress clean. Work and play make the body strong. Vaccination keeps away small-pox. Filth is the mother of sickness; cleanliness is the mother of health and long life. Morning and night ask God to bless you.

SECOND STANDARD.

2. Care about Food.

Why do we eat? A stone image does not need food. The reason is that we work, while the stone image does not. Every thing we do wastes a little of our body, and this is made up by food. We also need to eat to keep us warm, and, if young, to make us grow.

Milk is the best food for little children. Different kinds of grain are eaten by those who are older. Wheat, joar, bajra, and maize are more nourishing than rice; but, with dal, rice is strengthening.

Ripe fruit is excellent, but children often makes themselves ill by eating it when unripe or overripe. Raw gram should not be eaten. Cooked food, if kept long, becomes unwholesome. In sickly times great care should be taken about melons and raw vegetables.

Rich cake and sweetmeats are not nearly so good for us as plain food. Too much food of any kind is hurtful. Food should be well chewed, and taken at regular hours.

3. Care about Water.

We can live longer without food than without water. One reason of this is that more than the half our body is water. The water we drink passes into the blood, and goes to every part of the body. If the water is bad, our health must suffer.

Pure water is clear, and has no colour, taste, or smell. The water in shallow wells is often bad from draining through filthy and dirty water from being washed into them. The water in tanks is made impure, by people bathing and washing clothes in them; by cattle and swine going into them. Tanks for drinking water should not be used for bathing and washing clothes. A great deal of fever is caused by bad water. Water from marshes is very unhealthy. Bad water may often be made wholesome by boiling.

Water is the best drink. It quenches the thirst, and does no harm. Many persons have been ruined by strong drink. It is better never to touch it.

4. The Value of Cleanliness.

No one can have good health without cleanliness. Filth is the mother of sickness; cleanliness is the mother of health and long life. Our bodies, clothing, and houses should all be kept clean.

Your skin is full of little drains. When you get very warm, the water comes out of these little drains in the form of sweat. This water is always coming out, not enough to be seen, but just enough to keep the skin moist and soft. It has been washing waste matter out of the body, so it is not clean. The mouths of these little drains are kept open by washing the skin. Dirt chokes them; the waste matter cannot escape properly; itch and other diseases often follow. Soap helps very much to cleanse the skin. After bathing, the body should be well rubbed with a clean towel.

Waste matter from the body sticks to the dress, pillows, &c. If rubbed against the skin, it goes into it, and the health suffers. Clothes and beds should, therefore, be kept clean as well as the body.

Houses should also be kept neat and clean. No filth should be allowed to gather about them, giving out bad smells, and making people sick.*

THIRD STANDARD.

5. The Value of Fresh Air.

We can live several days without food, but we die in a few minutes without air. Every body knows that we need air; but many think that *any kind of air will do*. This is a great mistake. We also need water, but every kind of water will not die. Water from a filthy drain would soon kill us. There are many kinds of poison in the world; but perhaps the poison which kills most people is *bad air*.

Fresh air cleanses our blood and takes away waste matter that would hurt us. Pure blood is bright red; when it is mixed with waste matter it becomes dark coloured. When people are hanged or drowned, the blood is not purified by fresh air; only the dark blood goes round and round, so they soon lose their senses and die.

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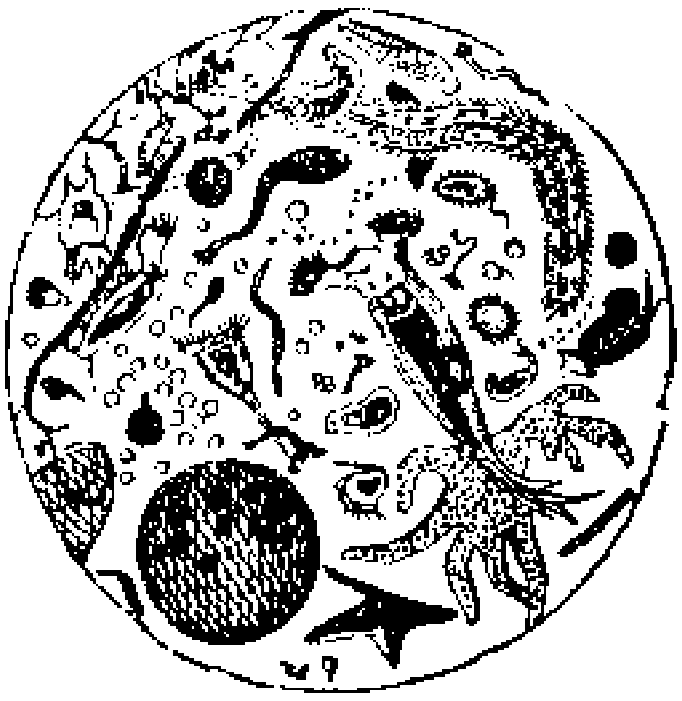
* Dr. Bidio says: "The practical use and value of latrines form

Cattle and other animals breathe as we do, and spoil air in the same way. Lamps burning have a like effect. But worse than all, the air is made impure by filth.

People suffer most from want of air at night. Houses should not be so close as to shut it out. Nor should the mouth, as a rule, be covered with a cloth when we sleep. When working we should try to sit upright, that more fresh air may enter our bodies. It is unhealthy to lean forward.

6. The Need of Pure Water.



The picture above shows a drop of impure water as seen through a glass for looking at small objects. It swarms with little animals and plants. Thousands of them are swallowed by people who drink impure water. Pure water is as needful as pure air.

Wells often contain bad water. The water drains into them through ground full of filth. Some of the worst kinds of sickness are caused by drinking water containing putrid matter from drains or from the bowels of people. Wells should have a low wall around them to keep mud and dirty water from being washed into them. The ground should also slope, that the water may run off. Trees should not overhang wells, as their leaves drop into the water.

The water of tanks which dry up in the hot season is unwholesome. They should be filled up, and a large deep tank should be provided for drinking water only. There should be another tank for bathing, washing, and cattle. The best way to get good water from a tank is to dig a well near it. The water is made pure by draining through the earth. This is also the best way to get good water from rivers.

Bad water may often be made wholesome by boiling it well before drinking. This should especially be done when sickness

7. How to have Healthy Homes.

Health depends a good deal upon the houses in which we live. No house should stand in a hollow. Even in a dry situation it should be raised two or three feet above the surface of the ground. This will keep it free from damp.

Plenty of fresh air is what is most needed. Houses should not be crowded together, nor should too many people live in them. The want of fresh air is mostly felt in houses built of brick. Many of them have only a few small windows which are closed at night. The air spoiled by the sleepers cannot escape, and fills the room. There should be openings to admit fresh air. It is a bad custom to fill up bedrooms with all sorts of furniture, and even with pots containing food. This reduces still further the proper supply of air.

Houses should be whitewashed at least once a year. Rooms should be swept out daily, and once a week they may be washed with clay water; but daily smearing them with cow dung makes them damp and unhealthy.

Cattle, goats or fowls should not be kept in houses.

Plantain skins or other refuse should not be allowed to lie outside. Waste matter from the body should not pollute the ground near houses. If there are no proper privies, people should go to the fields, and with their foot turn some dry earth over what came out of them. This earth drinks in the bad smell.*

8. What to do in Pestilences.

Now and then fever, cholera, and small-pox prevail to a great extent and are called pestilences. If people took proper care, they would do much less harm than at present.

Fever is often caused by bad water. If good water cannot be had, it should be well boiled. This kills the poison. Cold winds are another cause of fever. The body should be kept warm. Exposure to the dew and night air should be avoided. A white powder, called quinine, is the best medicine for fever. It is sold at many post offices.

Cholera spreads most in filthy villages and towns. Houses should be whitewashed, and all filth and stagnant water removed. Drains should be kept clean. The body, especially the belly, should be kept warm. There should be great care about food. Cold rice, unripe and overripe fruit, are unwholesome. Water for cooking and drinking should be pure. Loss of sleep, exposure to the dew, and great fatigue, are to be avoided.

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* As already mentioned, the teacher should pay much attention to this, explaining the dry earth system. People must be taught not to ease themselves by the broadside or behind hedges. Night soil should increase the fertility of the country

SMALL-POX is kept away by vaccination. All should be vaccinated when little children, and again when twelve years of age. Then neither blindness nor death would be caused by the disease.

FOURTH STANDARD.

9. CAUSES OF SICKNESS.

Health is a great blessing. When we are well, we are able to attend to our own duties, and to help others. Sickness takes away our strength, and makes us a burden to those around us. We should, therefore, take all proper means to preserve health.

Sickness never comes without a cause. We may not know what made us ill; but good doctors can often tell. If we put our hand into boiling water, it is scalded; if we drink poison, it may cause our death. Most cases of sickness arise somewhat in like manner. If we eat large quantities of unripe fruit or other bad food, our stomachs will get out of order; if we sit with wet clothes on, we shall probably catch cold; if we use bad marshy water, we are likely to suffer from fever. There are many other things which cause sickness.

The air contains numerous small seeds of plants, blown about by the wind. If the seeds alight upon moist, rich soil, they spring up; if they fall on rock, they do not grow. Some diseases are sown in our bodies by minute seeds, as plants are sown in the earth. In small-pox seeds come away in great numbers from the body of the sick person. The poisonous seeds of cholera are often carried by water.

Filth, unwholesome food, exposure to the night-air, and whatever weakens us, prepare, as it were, our bodies to be fitting soil to receive such dangerous seeds. Cleanliness, good food, warm clothing, and whatever strengthens the body, hinder their growth. With proper care half the cases of sickness in this country might be prevented, and people would live several years longer. All should therefore learn how to keep well.

10. HOW TO GUARD AGAINST FEVER.

More than half the deaths in India are caused by fever. Besides those who die, many millions suffer, more or less, from the disease.

Fever is supposed to be caused by a kind of poison floating in the air. It is produced in greatest abundance when the sun dries the ground after the rains. Water takes it in, and hence fever often comes from drinking bad water. Water from marshes is especially hurtful. When fever is prevalent, drinking water should be well boiled.

The poison causing fever is strongest at night, when the body is weakest. Exposure to dew and night air should be avoided in feverish seasons. The body should be kept warm, especially at night. Sleeping in an upper room is a safeguard. Even a cot is some protection, for the fever seems to float near the ground.

Sleeping in damp clothes, exposure to extremes of heat and cold, fatigue and whatever weakens the body, are other causes of fever. When there is much fever, do not go out in the morning fasting, and take good food in sufficient quantities. Wear warmer clothing than usual. This is a great protection, for cold winds are one of the chief causes of fever.

The white powder, called quinine, is the best medicine for most kinds of fever. It is now sold in pice packets at post offices. Many persons stop taking food when attacked by fever, but this is a bad custom, making the disease stronger. Persons ill with fever should take conjee or milk, and gradually begin to take their ordinary food.

Bathing too freely after recovery, or in a cold wind, may bring on a relapse. This should be avoided, and the skin should be kept warm.

11. How to guard against Cholera.

This is a very dangerous disease; but, as in the case of fever, much may be done to guard against its attacks.

The poison seed of cholera comes from the vomit and stools of persons having the disease. Water is a frequent means by which it is carried. Discharges from the bowels sometimes soak into wells, and persons drinking the water are attacked. The dried excrements of persons who had cholera, blown by the wind, have also caused the disease. The vomit and stools should therefore be burnt.

The following means should be employed to guard against cholera when it is about:

Great care should be taken about food. Unripe and over-ripe fruit, raw vegetables and articles difficult of digestion should be avoided: cold rice which has stood all night is not safe. Meals should be taken at regular times. A heavy meal at night may bring on an attack. The drinking water should be boiled.

The clothing should be warm. A flannel belt round the belly is a great protection. Exposure to the dew at night or to cold winds should be avoided.

Cleanliness is of the utmost consequence. Houses should be whitewashed. All filth should be taken away. The compound should be swept clean and rubbish burnt. Drains should be cleansed with water. Privies should carefully cleaned out every day.

The body should be kept in good health. Whatever weakens

In the case of an attack, it is very important to give medicine at the commencement. Then it will often do good, while afterwards it is useless. Whenever cholera is prevalent and a person has a loose stool, he should take medicine at once.

12. How to guard against Small-Pox.

Small-pox is one of the most loathsome and fatal diseases to which people are liable. In former times it sometimes depopulated cities, and blinded or disfigured one-fourth of the human race. Out of thirty children attending a school in Rajputana some years ago, 22 were marked with small-pox and two had each lost an eye.

The great safeguard against small-pox is vaccination, discovered by an English doctor about a hundred years ago. He found that cows sometimes suffer from a disease, like small-pox, and that if matter were taken from them and put in the human body, there would be freedom from small-pox. This is called in English *vaccination*, from the Latin word, *vacca*, a cow. People are best vaccinated from calves.

There should be not less than four punctures in the skin, and for several days they should be protected from rubbing. Nothing whatever should be applied to them. Infants are best vaccinated when about three or four months old. They do not suffer so much, and cannot scratch the pocks, the chief thing to be guarded against. Besides, it is well to have vaccination over before teething begins. Vaccination should be repeated after puberty. This, as a rule, is perfect protection.

Small-pox spreads by poison seeds given out by those who have the disease. It is very catching. None should go near the sick except those taking care of them. A person who has had the disease should not be allowed to see others till all the crusts have fallen off. The clothes of the sick should not be mixed with other clothes, but boiled and dried separately.

Educated men should do all they can to encourago vaccination.

THE

PLAGUE

AND

ITS PROPHYLACTIC AND CURATIVE TREATMENT.

Debendra Nath Ray

BY

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Calcutta.

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1898.

INTRODUCTION.

AT a time when our fair metropolis is being threatened by the Plague which has devastated Western India, the public entertain a natural curiosity to know the particulars of that dreaded disease. To satisfy that desire, however imperfectly, has been the principal object, which prompts me to introduce this small brochure to the Profession and the public at large. In the description of the disease, the latest definite views of etiology and pathology have been given; and in the therapeutic portion, several remedies have been mentioned with their respective indications, of which one or the other is to be employed according to the well known Homœopathic law of cure. The preventive treatment, so important at the time of an epidemic, has also been briefly alluded to. If this little pamphlet can save one suffering soul among the Plague striken humanity whom the medicinal resources of the old School have hitherto failed to relieve. I shall consider myself amply repaid.

Thanks are due to Dr. Nripendra Nath Set for the valuable assistance he has given in the getting up of this little tract.

CALCUTTA,
6th July 1898.

D. N. RAY.

THE PLAGUE.

Definition: –By the plague we mean the BubonicPlague. It is an epidemic infectious disease, and runs a very acute course and is characterised by general high fever with the inflammation of the lymphatic glands of the different parts of the body, petechiœ and carbuncles.

Synonyms:—The Pestis; Typhus pestilentials; Typhus bubonicus; Septic or glandular Pestilence; The Black Death; Pestelential Fever; Mahamari, &c.

History:—The History of the Plague can be traced back to as early as the second or third century before Christ. In one of Oribasius Medical extracts from Rufus of Ephesus, a contemporary of the Emperor Trajan (98-117), the plague boils are described and their occurrence in epidemic form in Lybia, Egypt and Syria is alluded to. The first great epidemic which spread almost all over Europe and lasted for 50 to 60 years, occurred in the 6th century during the reign of the Emperor Justinian. Europe had been frequently troubled by epidemics of plague. But the great epidemic of 14th century known as "*Black Death*" was a terrible one. It is said to have originated in India or China and spread over the countries of Asia Minor to the north coast of Africa and Europe. No part of the then known world escaped its ravages; even the distant Greenland was depopulated. According to Hector's estimate 25 millions of human beings succumbed to it in Europe alone–about one fourth of its population at the time. Throughout the fifteenth, sixteenth and the greater part of the seventeenth century number of deaths reported from the Great plague of London in 1665, was 68,596 in the Metropolis. In 1666, the provincial towns were more or less severely infected from London. From the end of the 17th century epidemics began to occur less often in Europe and since the middle of the 18th century the greater part of Europe has escaped them altogether. In 1720 an outbreak occurred at Marscelles. This epidemic was one of the worst recorded in History. All these epidemics of plague in former days had been imported from the Eastern Countries. Turkey and Egypt were frequently the infected areas of plague.

The following are the countries in which the plague has occurred at the present century. In some of these places it has always been more or less endemic.

Balkan Peninsula and the counties adjoining—1814.

Astrakhan 1878—79.

Since this slight attack of plague, it vanished completely from the soil of Europe.

Tripoli 1856—59.

Arabia in the mountaineous tracts of Assir, on the west coast—in 1853, 1874, 1879, 1889, 1890, 1892, 1893 and 1895.

Mesopotamia 1867—68, 1873—74, 1875—77, 1880—81 and 1892.

Aderberjan in Persia 1863—64, 1870—71, 1873—74, 1876—78, 1881—83, 1885—86, 1890—91 and 1892.

Turkestan imported from Persia 1892.

In southern China it has long been endemic and at the fresh epidemic of Canton in 1894. 60,000 souls were carried away within a few weeks.

In India several outbreaks of the Pestilence occurred in the fourteenth century (1325—1351); in the fifteenth century (1443); in the sixteenth century (1590—94); and in the seventeenth century (1611—18) in Punjab, Ahamedabad, Lahore, Delhi and Cashmere. In 1683 to 1689—a second outbreak during the same century in Ahamedabad and its neighbourhood.

The first recorded epidemic in India during the present century occurred in 1812, in the Island of Kutch and spread to Gujarat, Scindh &c., and lasted till 1821. At Hansi in the district of Delhi, the plague occurred in 1828—35. At Bareily in Rohilkund, at Pali in Rajputana (called the Pali Plague), Jodpoor and Merwar in 1836—37.

The other centres of the disease were the provinces of Kumaon and Ghurwal, situated on the south western slopes of the Himalyas where there were repeated outbreaks of plague called *mahamari*. It commenced from the year 1823 and with occasional cessation continued to 1897, so these provinces in India may be considered as the proper home of the disease.

The present outbreak in the Bombay Presidency commences in August 1896. It has not ceased even now. On the other hand we the distant neighbours are threatened with an epidemic. During this Bombay epidemic over eighty-nine thousand souls have been lost.

Aetiology :—The Plague is due to a specific bacillus called cocco-bacillus. It is a short thick rod with rounded ends and is found in large numbers in the buboes and may be present in the blood, expectoration, urine and excreta of the sick. It can be cultivated artificially. This bacillus shows a notable tendency to perish outside the human body or bodies of certain animals. The cultivations of plague bacillus die after 15 minutes continuous exposure to a heat of 70 c and to a 80 c, they die in 5 minutes. The duration of life of the bacillus under ordinary circumstances is utmost eight to ten days, often only two to five days. Suspended in pipe-water, the bacilli were found to be dead in three days

10 minutes; and sulphuric acid solution (1 in 2000) kills them in less than five minutes. The Plague bacilli are more sensitive to mineral acids.

The sputum of plague patient containing large quantity of bacilli, under favourable circumstances retains its infectiousness till the tenth day. In a moist condition the bacillus retains its vitality for some time. In infected areas the bacilli are found in colonies on the surface soil and on the bedding clothing &c., of the sick. The damp, dark ground floor is a more suitable place for their habitation. When they invade the human bodies, different groups of symptoms manifest themselves according to the localities, as will be mentioned afterwards.

Modes of Propagation :—Infection probably takes place by the air or by touch, that is, inhaled through the respiratory organs, or through the skin or with food. In the pneumonic cases the infection enters through the lungs and in all cases in which buboes appear in the lymphatic glands of the extremities—such as inguinal, femoral or axillary—the infection enters through a breach of continuity in the skin. In cases of buboes of the cervical glands, the infection probably takes place through the tonsils: The primary infection of the intestinal tracts takes place through the alimentary canal.

The bacillus multiplies in the organism of those who are attacked by the disease. The infection varies in different types—thus the danger of infection from the simple type of bubonic plague is comparatively less. If the bubo is opened before the bacilli have been killed in the natural course of suppuration the infectious germs are found in abundance. The septicœmic form plays an important part in the propagation of the disease, since the bacilli are numerous in the excreta of the patient. The pneumonic variety is the worst and most dangerous form, in point of infection, as the matter expectorated by the patient is practically a pure culture of plague germs, so it is highly infectious. The infection may be carried by healthy persons, or by lifeless objects, such as linen, clothes, beddings and the like, which have been used by the diseased persons; or by animals, such as rats, insects &c. In an endemic area the poison seems to be attached to the soil. When an outbreak of plague takes place in an epidemic form, it has been observed that the animals which live in or on the ground especially the rats die in large number for two or three weeks before the human beings are attacked. If the plague is imported any where, for the first three or four weeks isolated cases occur in the neighbourhood of the imported case and then the infection becomes general and the disease breaks out in an epidemic form spreading far and wide. It may last for a few weeks or months or may extend over several years. The abatement of epidemic generally comes on rapidly but sporadic cases still may linger for years; and a fresh epidemic may break out again. A moderate warmth with dampness seems to be most favourable condition for the development of an epidemic. The excessive dry heat and the severe cold are unfavourable for the spread of the disease. There has been exception to this in some instances.

The Pre-disposing Circumstances :— All ages, including new born children, and both sexes are equally liable to an attack.

1. The women and children chiefly girls who stay indoors, as well as the occupants of the ground floors are more affected. Pregnancy and child-birth are no security.

2. Between ages of 2o and 40 years both sexes are liable. From youth up to thirty the disease gradually increases and having reached its height declines as the age advances. The disease seldom occurs after people have passed fifty.

3. The occupation has no influence, though the persons who have much to do with water, such as water carriers, and

3. Living on the river is a great safe guard against plague.

4. Second attack of plague is rare but not altogether absent and if it does occur the disease usually runs a mild course.

5. There is no race predisposition, but the better classes, who attend to cleanliness and live in healthy surroundings secure a marked immunity. On the other hand the poor classes are always most affected owing to the bad hygienic conditions under which they live, in all epidemic diseases it is this class of people who suffer the most.

6. Undue exposure to colds, bodily and mental exertion, error of diet, fear of the disease &c. render one more liable to be attacked.

Symptoms :—*Incubation period.*—Yersin gives the period from four to six days Scheube from two to seven days. In a virulent epidemic form it may take only a few hours and in exceptional cases it may last as long as fifteen days.

The disease may be classified for our convenience, into different types accordingly to the characteristic signs and symptoms peculiar to themselves. But all these different types are the product of the same specific virus.

1. Bubonic or with glandular enlargement.

This may again he subdivided according to regions—(*a*) Femoral, (*b*) Inguinal, (*c*) Axillary, (*d*) Cervical, (*e*) Tonsillar.

2. Without Glandular enlargement. (*a*) Septicaemic, (*b*) Pneumonic, (*c*) Gastro-intestinal, (*d*) Nephritic and (*e*) Cerebral.

The average percentage of cases of this latter variety is less than the former but the attack almost always ends fatally. Two or more types may be mixed up so as to produce a com-

In all cases there are some general symptoms before the development of typical ones. We shall consider the general symptoms first.

The disease as a rule, commences suddenly with a more or less rigor followed by a rapid rise of temperature, or there may be sudden rise of temperature without the initial rigor. The skin has a burning hot and dry feeling, the pains are felt more or less on the back and limbs, the face is somewhat swollen, eyes are suffused, conjunctivœ are reddish, there are nausea and often vomiting which at times is very severe, intense headache, excessive thirst, a sensation of prostration, aggravated by vomiting, anxious expression and inability to sleep, this last is a marked symptom. The tongue is moist and swollen, thetip and edges are clean and coloured from light to deepish red and on the rest of its surface there is a thin fur with a white glistening appearance or a light reddish brown-colour. The patient is irritable in putting out the tongue and when he does so, it is jerky and moves from side to side. There is impediment of speech and staggering gait, as if drunk. The pulse is full, soft and rapid at first and then becomes dicrotic and thready as the heart gets weaker and weaker. The heart-beat is from 100 to 140 per minute. The respiration is hurried, 40 to 50 per minute. The bowels are generally constipated, in some cases there is relaxation and the stool has a peculiar fœtid smell. There is a slight darting pain in some of the lymphatic glands and a short day cough. The urine is highly acid, and rapidly decomposing on standing, the specific gravity varies from 1010 to 1030. The urea and uric acid become less and in some cases albumen is present.

On the third or fourth day with the progress of the case the temperature rises quickly—reaching a maximum of 103, 104 or higher. In the worst cases the temperature rises very high and the patient succumbs in a very short time - 24 to 48 hours or even less. If the patient survives the acute early rise of temperature. The pulse is thready, the tongue is less moist, and has a raw look at the tip and edges. The prostration and sleeplessness become greatly increased. The patient exhibits an appearance of deep anxiety and distress. On the third day in those cases where there is congesion of the nervous centres or involvement of them in the Septicœmic process, the cerebral symptoms supervene. The patient is sensible to all that goes on near him, but appears to be only partially conscious, listless and drowsy; it is with difficulty he can be made to hear; his speech is thick and indistinct from the loss of power of co-ordination of muscular movement. There may be cramps in the muscles and in some cases when the cerebral centres become more irritable, violent delirium takes place.

By this time the symptoms peculiar to the different types of the disease exhibit themselves and the further progress of the case depends upon those symptoms. If they improve, the temperature goes down with a copious perspiration. The cerebral symptoms gradually subside. The pulse becomes stronger and less frequent and the expression of the patient becomes more natural. But if the primary symptoms increase and the case be a complicated one—the nervous symptoms assume a violent form, furious delirium, or coma and death ensue.

Now, let us consider the different types of the disease separately. The bubonic, that is, with glandular enlargement is the most common form of plague and is seen in about 80 to 90 per cent of all cases. The swelling may appear just at the onset of the disease but usually on the second or third day and sometimes later in the course of the attack. The bubo varies in size according to the number of glands involved. It is tender, the skin over it is warm and the surface either smooth or nodulated. The buboes either subside or very often suppurate. This latter is considered to be more favourable termination. When the patient lives more than five or six days the bubo ripens, pus is formed which is discharged of itself—giving off a very offensive smell. The healing process is completed after several weeks. In rare cases the bubo remains stationary for weeks before it subsides. The simultaneous buboes at the groin, armpit and the neck are very rare occurrences. But when death occurs within 48 hours before the bubo gets time to develope petecheal spots on the skin or hœmorrhage from the mucus surface may be observed.

Femoral type.—Here the infection enters through the lower extremities. The lymphatic glands on both sides may be involved, usually one side. The swelling appears two or three fingers breadth beneath the femoral ring, one gland or chain of glands may be involved, forming a mass bubo. It is very tender and grows rapidly to a big size. The skin over it, is warm and tense according to the size. The bubo either gradually disappears or, suppurates, if the latter takes place early it is a favourable sign. The average attack is 65 to 90 per cent of all cases. The death rate is 57 per cent. The mortality of right side is worse than the left. On the whole this is the mildest form of the disease.

Inguinal type.—Here the inguinal glands are enlarged. In all other respects it resembles the femoral variety except in the number of cases which is less.

Axillary type.—Here the infection enters through the upper extremities. The deeply seated glands of the armpit either on one or both sides appear to be first affected. The bubo does not grow to a very big size. In other respects it resembles the general characteristics of the glandular variety. The average number of cases is 15 to 20 per cent. The mortality is 70 per cent. The left side is worse than the right. The attacks are much less than either femoral or inguinal, but the percentage of mortality is much more.

Cervical type.—The infection enters through the tonsils. One or both sides may be infected. Buboes do not grow to a very big size. Average attack is some 5 to 10 per cent. The mor-

Tonsillar type.—Here the children are more affected. The tonsils, the glands of the neck and the glands on the edge of the lower jaw-bone get greatly swollen either on one side or both. The swelling comes on quickly accompanied by pain. At the beginning the bubo is small about the size of a walnut but afterwards, it may exceed the size of a goose egg. There is a nasal catarrh with soreness of the nose. The mouth is often open. There is danger of asphyxia due to the œdema or cellulitis extending to the chest. The average attack is not much, but the percentage of mortality is very great. The nearer the head the more fatal is the case. So the buboes on the neck, makes prognosis very grave.

Septicœmic type.—Here the infective virus enters primarily into the blood and all the general symptoms are characterised by their extreme intensity. This type is always very grave as it is shown by the great disturbance of the constituents of blood. The hœmorrhages, such as petechiæ appear in the skin, usually on the neck, the chest and the extremities in the forms of boils or large red, black or bluish spots, which are so numerous that the whole body is covered with them. Tke hœmorrhages may occur from the nose, mouth, lungs, stomach, intestines, kidneys &c. They usually occur at the height of the disease from the third to the seventh day or may appear earlier. The glandular enlargement may appear in several regions later on. Carbuncles, sometimes make their appearances within the 7th day. There are almost always pains and burning heat on the affected parts. The carbuncle begins with a small, reddish swelling with severe burning, grows quickly and extends rapidly forming a big protuberance with one or more blisters over it. The carbuncle may appear in all parts of the body with the exception of the palms of the hands and the soles of the feet. They are mostly found on the legs, the buttocks and on the neck. They usually occur singly but several may make their appearance.

spreading may cause the gangrene of a whole limb. The pustules, furuncles, abcesses, erysipelas and gangrene may develope with an irregular fever showing the presence of pyœmic conditions.

In favourable cases the improvement begins with the appearance of the localised phenomena. The fever becomes less, the pulse becomes stronger and the appearance of the face more natural; the convalescence commences on the sixth to tenth day. In other cases the typhoid condition continues up to the 16th to 20th day, but in majority of such cases, death takes place suddenly with convulsion and coma. The average attack is less, but the mortality is over 90 per cent.

Pneumonic type.—Here the infective virus enters the system through one or both lungs by inhalation. As a rule—bronchitis or lobular pneumonia is developed. There may be several patches of this latter in each lung and they may coalesce so as to form diffused areas of exudation, but the whole lobe is never affected as in cases of lobar pneumonia. There is a dry cough, difficulty of breathing, pains in front of both sides of the chest along the borders of the sternum and also behind it. The hœmorrhages from the lungs are rare, but sometimes a small quantity of blood is noticed in the expectoration owing to the exudation from the mucus surface. This variety generally terminates fatally on the second day of disease or death may occur at any stage of the disease. The immediate cause of death is the sudden failure of the heart or gradually the pulse becomes very frequent, small, soft, hardly perceptible and often irregular; coldness of the extremities, cyanosis of the face, hiccough and convulsive twitching of the muscles precede death. The attacks are less common and the mortality is very high.

Gastro-Intestinal type.—Here the infection enters through the alimentary canal and affects the internal lymphatic glands. There are pains in the lower part of the abdomen, region; the distension of abdomen appears early with retching and vomiting and also inability to rest except in a certain posture. If diarrhœa occurs the stools do not resemble those of Typhoid fever. But there is a class of cases which are choleraic in character, the prominent symptoms are slightly perceptible or imperceptible pulse, coldness of the extremities and excessive vomiting and purging. The presence of a high temperature would indicate the nature of the disease. The other diagnostic signs are the early appearance of abdominal distension, bacteriological tests and the examination of the blood. This type of disease is rare, the mortality is very high.

Nephritic type.—Here the kidneys are the primary seats of the disease. The renal discharge is much diminished, at times even quite suppressed. There may be hœmaturia. This is a very rare form of disease.

Cerebral type.—This class of cases is characterised by their extremely rapid course. The patient succumbs with extreme prostration within twelve hours to two days, even before the appearance of the characteristic local symptoms. He dies early of convulsions, coma and syncope, overwhelmed by the toxic products suddenly attacking the great nerve-centres. The duration of the different types of the disease varies from a few hours to four weeks or longer. The convalescence commences from the 6th to 10th day or may be unusually prolonged by the occurrence of typhoid or pyœmic conditions. There is a class of mild cases either at the commencement or towards the close of an epidemic. These are very deceptive by nature as the patients do not experience the severe general suffering except slight uneasiness, the fever may be absent and they may go about. The buboes are formed which either suppurate or subside but under all these favourable circumstances the patients suddenly and unexpectedly die, in all probability through the influence of the

The Sequelœ.—The relapses are unfrequent but when they occur, they are always dangerous and end fatally. The persistent suppuration of glands and of the ears ; deafness, pulmonary gangrene, enlargement of the spleen, obstinate bleeding from the urethra, dropsy, paralysis, dumbness and mental aberraton are rarely observed.

DIAGNOSIS.

Schube Says :—"The diagnosis of the plague is frequently difficult particularly at the commencement of epidemics. In severe cases malignant malaria and typhus may be mistaken for it ; and in milder ones veneral buboes and other lymphatic inflammations may lead to error in diagnosis. What is decisive for the diagnosis is epidemic occurrence i.e., coincidence with the presence of an epidemic, the extraordinarily severe general suffering accompanied by high fever and the buboes even although there may be exceptionally rapid cases in which the buboes are absent, there will in any epidemic be cases of a typical nature, leaving no possible doubt of the nature of the diagnosis".

It is at the commencement as well as towards the close of of an epidemic, when isolated cases of mild nature occur, difficulty is experienced in diagnosing such cases. There is also some difficulty in diagnosis in the cases of the intestinal variety with choleraic symptoms and also in cases of the pneumonic variety, in both of which the glandular swellings are either absent or the patients succumb before their appearance. In such cases the only means of diagnosis is the bacteriological examination by persons with special knowledge, as mistake will lead to serious consequences. The cerebral type is still more difficult to diagnose.

The local Government has pronounced this city since the are supposed to be occuring here and there. This is the time when most cases are diagnosed as plague though they are entirely unconnected with that disease. This has been taking place almost daily.

The ordinary high fever, diarrhœa, pneumonia, tonsilites mumps, chronic glandular enlargements and the like are almost indiscriminately diagnosed as plague. This can be avoided by consulting the medical practitioners of this place who have great deal of experience in such cases, which occur, throughout the year more or less. They are the best authority on this subject and their opinions and diagnosis will have a great weight and will save any amount of trouble to the people.

PROGNOSIS.

Prognosis :—The Prognosis of plague is almost always grave. It surpasses all infectious diseases in severity. The great mortality characterises an epidemic. This varies in different epidemics, in some the percentage of deaths is higher than eighty but is seldom below sixty. The number of deaths is greater at the height of an epidemic that at its decline. When strongly-built persons are attacked they resist better ; the young children and the aged almost invariably succumb. The mortality is much greater amongst the poor than the rich, because the former are usually exposed to bad hygienic conditions. The simple bubonic cases usually end in recovery. The septicœmic and pneumonic cases are most fatal though in rare instances recovery may take place. The early appearance of buboes, their tendency to suppurate early, that is, on the third and fourth days, a copious free perspiration, a distinct remission of fever, strong regular pulse, natural expression of the face, constipation and surviving the 7th day, are looked upon as favourable signs. On along the spine or at the back of the neck, hœmorrhages, dyspnœa, violent delirium, convulsions, considerable diarrhœa, vomiting, weak and irregular pulse, cyanosis are regarded as unfavourable symtoms.

Morbid Anatomy :—As the death may take place any time in the course of the disease, the post mortem changes accordingly vary. The body is moderately nourished. The *rigor mortis* is delayed. The eyes are sunk in the orbits, lusterless and the eyelids are half-open, the pupils are dilated. The complexion is either pale, bluish or blackish. The tongue is swollen, coated with dry white or yellowish brown fur. The forehead and the hands are cold and clammy. The glandular enlargement in one or other locality would be seen unless the person had died very early. In pneumonic or septicœmic types this might be absent. In the former type the body and the face have a bluish hue while in the latter, cutaneous carbuncles, furuncles, pustules abscesses, petechiœ and hœmorrhages &c, may be present.

" The brain and the meninges are congested. and the latter occassionally show ecchymoses. The subarachnoid at time contains a serous fluid, and the ventricular fluid may also be in excess. The brain substance itself is usually found to be normal. The membranes of the spinal cord show changes similar to those present in the cerebral membranes. Ecchymoses occur on the serous membranes, and sanguineous or serous effusions are often present within the serous cavities. The lungs are sometimes normal, at times bronchitis, hypostasis, pneumonia, apoplectic patches and hœmorrhagic infarctions are present.

"The heart particularly its right half, is strongly expanded by loosely co-agulated or liquid blood ; its substance is frequently pale and limp ; the large veins of the thoracic

"The liver is usually slightly swollen and full of blood; the bile plentiful, dark, and thick and the walls of the gall bladder are sometimes œdematous. The spleen is swollen as a rule, often to double and quadruple its normal size, dark, full of blood and soft. The mucous membrane of the intestine and the stomach frequently shows ecchymosis, and here and there injection and increased secretion of mucus. In the stomach there are also at times hœmorrhagic erosions and in the intestines near the ilio-cœcal valve and extending to the vermiform process, ulcers have been found. The mesenteric glands are usually somewhat enlarged, at times injected to deep or affected ecchymosis. The kidneys are often, probably in consequence of acute parenchymatous changes, swollen and full of blood and show ecchymosis both on the surface and on the pelvic membrane. Not unfrequently coagulated blood is found in the pelvis and continued down into the urethra. The urinary bladder is at times filled with bloody urine, and its mucous membrane ecchymosed."

"The most considerable, constant and characteristic changes, presented by the plague, occur in connection with the lymphatic apparatus. The exterior buboes, which may grow to the size of a goose-egg and may even attain to a weight of several pounds, specially appear in the glands of the groin, shoulders and neck and frequently extend inwards so that the groin-buboes may communicate through the inguinal ring with the glands of the sacral and lumbar plexus and along the spine as far as the diaphragm, while the shoulder and neck buboes may communicate with each other and with the lymphatic glands in the mediastinum. The tissue surrounding the affected glands frequently shows more or less extensive hœmorrhage. In those cases in which the disease has ended fatally during the first day and before any buboes have developed, single glands in the usual place have as a rule, been found in a swollen condition."

MEASURES.

Preventive Treatment.—This is an important matter during an epidemic of plague. The simple hygienic principles should be strictly carried out. *1. Cleanliness. 2. Free Ventilation,* for this purpose the windows of the house should be kept open. *3. Over crowding* must be avoided. *4. Disinfectants* should be freely used in and around the houses. No filthy matter should be allowed to be accumulated. *5. House Drains, Street Drains, Sewers, Water-closets* and *Privies,* should be carefully examined over and over to see that they are in proper order. 6. The Quarantine for ten days by land and water, has been much talked of as a sure preventive measure against the importation of the disease. The infection is generally carried through the body-clothes or bed-clothes of the patient or through the furnitures of the attendants; these should be either burned or disinfected. The floors and the furniture of the sick-rooms should be thoroughly disinfected. The urinals, bed-pans, and the spitting-pots are required to be thoroughly disinfected every time they are used. The *excreta* should be equally treated before they are thrown into the water-closets. A solution of carbolic acid (1 in 100), perchloride of mercury (1 in 1000), sulphuric acid (1 in 1500) or lime water, should be used for the above antiseptic purpose. The acid, especially the mineral acid, has a great disinfective power as regards the plague-poison. The virus, whenever it comes in contact with acids is destroyed. So, in the human economy we have a natural preventive, the acid secretion of the stomach.

With regard to the disposal of the corpses, they should be burned and when buried it must be several feet below the ground.

Selection of Room.—The room for the patient should be should have windows for the free communication of fresh air from outside and if practicable a second room near the former would do well for the attendants. In the room there should not be more things than what are absolutely necessary; the carpets should be taken up, and also there should be such things that can be easily disinfected. One single bed should be placed in the middle of the room for free ventilation and ready access on all sides. All the *excreta* should be received in some vessel, either chamber-pots or bedpans &c., and these basins should contain some disinfectant substance as has already been said before. Nurses and other attendants should carefully avoid mixing with the rest of the family members, that is they should observe segregation as much as practicable under the circumstances.

Prophylactic Treatment.—Acid drinks during an epidemic may be recommended as a prophylactic; for this purpose sulphuric acid or lemonade may be used.

2. Rubbing the body especially the face and the limbs with oil may be recommended as a prophylactic on the ground that the oil-carriers are said to enjoy some immunity.

3. Living a regular mode of life, attendance to cleanliness, living in good ventilated rooms, and the avoidance of all contact with diseased persons and their belongings act in a great measure as a prophylactic. Now a few words as to the medicinal prophylactic. *Buboninum* has been mentioned by me publicly as a probable prophylactic and a curative agent for plague. But I did not give any reason why it should be so. Now let us see what it is and how it acts. *Buboninum* is a sterile morbid product (of cultured virus,) it is perfectly harmless in itself, and when it is introduced in the system in health, it produces symptoms very similar to those produced by the plague, but it would never produce the plague itself. A sensation of chilliness, *rigor*, more or less pains all over the

and a general feeling of malaise, sometimes vomiting, occasionally diarrhœa, very marked weakness with feeble pulse, the pains in the joints without much swelling lasting for some days, erythematous rash more or less all over the body and sometimes urticaria, lymphatic glands enlarged and painful, loss of appetite, a nasty clammy taste in the mouth, weakness in the lower extremities, mental excitement and a *feeling of unrest*, irritability of temper, *confusion of ideas*, a dry cough lasting for sometime &c. &c. are the symptoms commonly observed. So, we are of opinion that *Buboninum* 12th, 30th or higher potencies should be used as *the prophylactic*, for the plague—one or two pills (as this is a more convenient form) according to the age, once every second day or so during an epidemic, and the lower potencies as a curative agent may be administered as often as may be required to combat the general symptoms of adynamic fever.

It is applicable to all the different types of the disease; but, it should be given in different potencies according to the severity of symptoms. The lower for the more violent types. One word more—this *Buboninum*, should not be mistaken for *Buboin* a, morbid product of an ordinary bubo, which has very little to do with the plague.

St. Ignatia.—As a prophylactic and curative remedy for plague, had been used by late Dr. J. M. Honigberger, who was led to believe its efficacy from the usage of the people especially the Armenians of Constantinople, who, during the epidemic of plague in 1836, wore on their body the bean of St Ignatia, attached to a string, as a preventive against the disease. So, this may be tried as prophylactic against plague. Dr. Sircar is also in favour of it. As a curative remedy, the same Doctor Honigberger had occasion to take the small pills of *Ignatia*. when he took ill at Palee during the “ Palee Scourge,” and got himself cured with them. The second dose of these pills, he said, was enough to bring on a profuse perspiration the glandular swelling lasted for some three weeks. As his was a genuine case of plague, it is worth a trial.

Dose.—As a prophylactic it should be given high; and more frequently as a curative remedy in low potency.

Treatment.—We are aware what a sad failure the Allopathic mode of treatment has proved in cases of plague during the last epidemic in the Bombay Presidency. But we have great hopes, especially when we learn from Dr Honigberger, that he successfully treated many cases of plague at Pera Hospital in Constantinople in 1836, with remedies prescribed on homœopathic principles, although he did not mention the names of such remedies. Should the plague break out here we hope to meet with equal success, provided we get an opportunity to treat them. Cholera is not a less dreaded disease in its epidemic form, but the success of the New System in the treatment of cholera has raised the system to a higher level; and it is an established fact, that the Homœopaths are preferred to the followers of all other systems in cholera cases and the same thing ought to happen here. Now, as in cases of cholera, so, in plague, we should always bear in mind that we have to deal with the pathological symptoms produced by the introduction of the specific poison in the system. We shall mention here only a few remedies although recourse might be had to any indicated remedy according to the peculiarity of the individual case. We hope our endeavour will be crowned with success.

Pyrogenium.—Is the next medicine we pick up. This powerful remedy, acts against all kind of blood-poisoning. Its principal indications are——chilliness, restlessness, very high temperature, muscular debility, often vomiting, diarrhœa rather common, thickly white or muddy coated tongue excessive thirst, foul breath, swollen tonsils or glands, of the neck, extreme prostration, incoherent talks, delirium &c. It has a great influence in lowering the temperature. So it when the temperature suddenly rises very high and the patient dies of a peculiar exhaustion. It should prove a great remedy for the Cerebral, Septicœmic or pyœmic type either with or without the presence of the typhoid conditions. For the intestinal type, when the mesenteric glands are involved and there is distension of abdomen (tympanites) with copious loose offensive evacuations, it would prove equally good; and it would also prove effective in Tonsillar and Cervical types.

Dose.—It easily gets decomposed so it is difficult to get the genuine substances, below 4th centicimal. It should be used in different potencies.

Anthraxinum.—Another powerful remedy of the above class, which we should not lose sight of. It is a deeply acting remedy and we all know how in cases of carbuncles with Septicœmic symptoms it proves efficacious ; restlessness ; great irritability of mind and body ; cutting pains in the enlarged glands or in inflamed cellular tissues ; convulsions ; stupor ; and all the general symtoms of adynamic fever.

Dose.—It should be given in 30th potency.

Crotalus Horridus.—Of all the serpent venoms, it has the strongest resemblance to the worse types of the plague. Let us see what are its chief indications—chilliness ; dry exhausting fever with thirst, nausea and vomiting ; violent vomiting of food, or of green fluid or of blood ; swelling of the tongue nearly twice the normal size, brownish or reddish in colour ; deathly pale and bloated face ; trembling lips ; articulation indistinct, or loss of speech ; red watery eyes ; pulse at first rapid and hard, then weak and slow at times imperceptible ; difficult respiration, dyspnœa, severe pains in the chest ; moderate cough with expectoration of bloody mucus ; sleeplessness, drowsy but cannot sleep ; constipation or diarrhœa ; the inguinal and axillary glands swollen and tender ; the parotid and salivary glands are greatly faintness, rapid loss of strength; intense headache, extending to the eyes and temples; anxiety with restlessness ; delirium worse at night ; convulsions from time to time with trembling of the limbs ; indifference ; half opened or staring eyes ; coma. Hœmorrhage from all the orifices of the body, eyes, ears, nose, mouth, urethra, and bowels ; tendency to blisters, carbuncles and gangrene. It is surely to be useful in Septicœmic type with the predominating symptoms of blood-poisoning; in pneumonic type with the chest symptoms, in Intestinal type with looseness of the bowels and also in mild type with glandular enlargement.

Dose. Sixth potency and upwards—can be hypodermically injected if necessary.

Lachesis.—Is the second serpent venom we shall consider—Chilliness, with longing for fire ; warmth over the whole body without perspiration, heat as from orgasm of blood ; restless and uncomfortable ; hot hands and feet, seeks cool place to keep them ; pains in the small of the back with yawning and stretching of the arms and legs-pains in the hips and thighs ; trembling of the body with fever, stumbling gait ; depressed and anxious look, sad expression ; violent headache, can scarcely raise his head from the pillow ; rush of blood to the head ; confusion in the heads great irritability ; much talking during the febrile conditions ; sleepiness without being able to sleep on account of internal restlessness, restless sleep ; perspiration at night strong smelling ; swollen, red eyes ; nasal catarrh ; bleeding from the nose, the tongue is some what swollen and trembles when protruded, dry, red, cracked at the tip and edges ; earthy grey colour of the face ; dryness in the mouth and thirst ; nausea and vomiting, vomiting of bile or blood ; swelling of the face and lower jaw, worse on the left side, swelling of the throat and tonsils, with difficulty of swallowing ; liquids cause more difficulty in swallowing than solids ; swelling of the cervical nothing tight on the throat; a feeling in the throat as if something would suffocate him; boils with violent burning or throbbing pain on the back; indurated buboes with hectic fever; axillary glands swollen; distension of abdomen, rumbling and gurgling in the abdomen; frequent thin offensive stools or constipation; gnawing pain in the lower portion of the left inguinal region; frequent micturition urine dark yellow, reddish sediment; short dry cough worse after every sleep, expectoration scanty, shortness of breath and great prostration unable to get breath, must sit up; chest feels swollen with violent pain; great physical and mental exhaustion, faintness, loss of consciousness with somewhat small, slow and almost imperceptible pulse; loss of strength and disappearance of the pulse with cold feet and gradually complete loss of consciousness. It should be administered in cases when the blood gets easily decomposed and the degeneration of the tissues takes place quickly. It is a valuable remedy in all adynamic and typhoid conditions of the disease, such as cerebral type with pronounced cerebral symptoms; septicœmic type with abscesses, carbuncles or gangrenous blisters &c.; Intestinal type with severe abdominal symptoms; tonsillar and cervical types with violent throat affections; axillary and inguinal types.

Dose.—6th potency and upwards.

Naja Tripudians.—Is the most virulent of the serpent venoms. It affects principally the nervous system. It may be useful in some cases where the depression and lowness about the heart, with sudden rapid failure of strength, is very marked at the commencement of the disease, pulse is irregular, hardly perceptible or no pulsation could be felt at the wrists, speechless insensible, body cold and collapsed, extremities are cold and corpselike, the eyes are staring and fixed, lividity of face with an expression of anxiety &c.

Dose.—6th trit or upwards.

Rhustox.—Constant chilliness especially in the evening, then heat as from hot blood running through the veins, with pains in the limbs, pale face, great restlessness, must change position, sleeplessness, tongue red, dry and cracked, thick whitish or brown, stupefying headache, rush of blood to the head; high fever, pulse at first full and strong, afterwards slow, small, frequent and compressible, low-spirited with great prostration, incoherent talking, low mild delirium, delirium with mental and physical restlessness, stupor progresses slowly. Now it is a valuable remedy in adynamic form of fever with typhoid-like symptoms. It should be given in cases of mild septicœmic type with boils, abscesses; carbuncles; in pneumonic type with cough, difficulty of breathing rust-coloured sputum, dark brown tongue &c., in intestinal variety with thin, yellowish brown stools of a cadaverous odour, sometimes involuntarily in sleep, distention of abdomen with pain; in glandular varieties with swelling of the inguinal glands, these glands are swollen to a very great size, tightness and tensive pain as well as aching pain in the glands, painful swelling of the axillary glands, pressure on the shoulder like heavy weight, severe pain at the top of the left shoulder, tearing pain on the shoulder-joints, in cervical and tonsillar types there are nasal catarrh, swelling of the face, swelling of the throat and neck, difficulty in deglutition, the maxillary and parotid glands are greatly enlarged, dryness of the mouth &c.

Ailanthus Glandulosa.—Produces a low adynamic type of fever, severe headache, red hot face, congested eyes, dilated pupil; tongue moist coated white or dry and parched; swollen tonsils; throat œdematous, dry and choky feeling; the glands of the neck and the cervical glands sre swollen and painful, pulse rapid small, frequent and irregular; heavy hurried breathing; thin watery offensive diarrhœa, at times involuntary; semi-conciousness; insensibility; constant muttering delirium with stupor. It should be given in cerebral type of the disease, characterised by sudden extreme prostration, nausea, vomiting, stupor, (it is likely to act better than *Bell*, *Hyos* or *Opium*); in Tonsillar type with malignant throat symptoms and in Intestinal type with abdominal symptoms.

Dose.—It should be used low.

Baptisia tinctoria.—Acts principally upon the blood with a tendency to disorganization of it and produces a low type of fever with typhoid conditions. Confusion of mind; muttering delirium; restlessness; high fever burning in skin; flushed face; dark-red with a besotted expression, tongue shining; tonsils and parotid glands are swollen; difficult deglutition; can only swallow water; putrid breath; thin dark and very offensive stools; profound prostration; drowsiness; the torpid semi-comatose condition of the brain; at first accelerated afterwards slow and faint pulse. It should prove useful in those cases which at the onset begin with typhoid conditions, that is, the cerebral type of the disease; and also in tonsillar and Intestinal types.

Dose. —Low potencies.

Muriatic acid.—Causes a morbid condition of the blood similar to that found in malignant asthenic fever, with high temperature and great prostration of the vital forces; headache as if the brain were being torn; tearing, pains in the limbs, weakness of the thighs, causing a tottering gait; excessive prostration; pulse rapid and very feeble, intermits every third beat; tongue thickly covered with grayish-white fur; hinderance of speech; the swelling of the uvula and tonsils and also the swelling of posterior glands of the neck with pain on turning the head; inability to swallow, the attempt causes spasm and choking; thin offensive diarrhœa; passed involuntarily; unconsciousness with muttering delirium and moaning; sleeplessness at night with delirium; constant

Tonsillar and Cervical types with general typhoid condition ; sordes on the teeth, fetid-breath ; hœmorrhages from the nose, gums &c., and intestinal type, when the glandular system of the intestinal tract is affected, with involuntary putrid-discharges ; hœmorrhages ; dry tongue ; sliding down in bed, vacant, staring eyes ; dropping of the lower jaw, coldness of the extremities &c.

Dose.—Low potencies.

Carbolic acid.—Produces disorganization of the blood ; dull heavy headache as if a rubber band were stretched tightly around the forehead ; tremor of limbs ; pallor of skin ; clammy sweat ; imperceptible pulse ; stertorous breathing, great prostration ; convulsions ; delirium and unconsciousness ; loss of speech ; collapse ; the heart seems to almost stop. It should be given to the malignant types of the disease, when there is a tendency to rapid destruction of life. In cerebral and in violent Septicœmic types, it should be indicated and also in Nephritic type with scanty urine, high colored ; blackish or *almost black* ; at times contains large quantity of albumen ; or urœmic symptoms.

Dose.—It should be given in low potencies.

Phosphorus.—Is a most virulent poison, acting upon the blood, it tends to produce disorganization and destruction of it ; hœmorrhages and ecchymoses are caused chilliness in the evening, not relieved by warmth, heat with anxiety, flushed face ; burning in face and hands ; profuse perspiration at night or in the morning ; gait unsteady ; dull pressive frontal headache, great dullness of the head with heaviness and pain in it, bleeding from the noses ; tongue swollen, chalky white and dry ; bleeding from the gums ; much bleeding of small wounds ; swelling of the tonsils and glands of the neck ; constant nausea, vomiting of blood, mixed with bile, and mucus, or black vomit ; swelling of the axillary glands, hard, red, painful and worse on pressure ; later they depressed; great indisposition to mental or physical exertion; great anxiety and restlessness; great apathy; dislike to talk, answers slowly or not at all; great prostration of the whole system; hœmorrhages from the various organs and parts of the body; low muttering delirium; grasping at flocks; stupor from which he could be roused for a moment only to lapse back into a muttering lethargy; pulse rapid, full and hard at first and then weak, small, often imperceptible. It should be useful in pneumonic type of the disease with violent oppression of the chest and difficult respiration; expectoration difficult, frothy, rust-coloured, bloody, mucus streaked with blood; cough worse evening and night and from lying on left side; pulse small, skin dry; tongue brown; semi-consciousness, then stertorous breathing and coma; at times also lobular pneumonia may end in gangrene and pyœmia; in Gastro-intestinal type with constant nausea, unquenchable thirst; and the water is thrown up when it becomes warm in the stomach; vomiting of black substancss, of bile and mucus, of blood; abdomen distended, loud rumbling; and a sensation of great weakness; pain with enlargement of liver and spleen; painless debilitating diarrhœa; stools involuntary, whitish-gray, bloody or profuse hœmorrhage; in Nephritic type with acute pains in the region of the kidneys; scanty discharge of urine, turbid and high coloured, white deposit, cloudy sediment, albuminous, bloody.

Dose.—Third upwards. It is a remedy for acute as well as sub-acute types of the disease.

Arsenicum alb.—This irritant poison acting directly upon the blood, upon the tissues and upon the nervous system, produces an asthenic condition of the system; great prostration, weakness; exhaustion of vital power; peculiar thirst; rapid emaciation. It will be indicated in some stage of the disease; delirium at night with great restlessness; sad, anxious mood; dread of death; intense cold sweat ; livid blue lips ; tongue swollen, may be whitish coated or fiery red, dryness of the mouth drinks often but little at a time ; loathing of food, constant nausea, violent vomiting, retching, hiccough, burning pain in the stomach at abdomen distended and painful ; involuntary stools, black, putrid, dark bloody, blackish-brown ; hœmorrhages from from the bowels ; pulse is rapid, weak, irregular unequal with occasional fluttering, pulseless ; the above symptoms indicate its usefulness in Gastro-intestinal type of the disease. The submaxillary glands are swollen with aching and contusive pain ; swelling of the parotid glands and also of the tonsils ; cough with bloody sputum ; stitches in chest when coughing ; great dyspnœa ; face cyanotic and covered with cold sweat. It is a valuable remedy in all forms of adynamic fever ; it is indicated in early as well as later stages of the disease when there is extreme prostration, great restlessness &c.

Dose.—3rd to 30th potencies.

Stramonium.—Dullness of all the senses ; stupid in difference to every body and every thing ; unconscious snoring ; twitching of the hands and feet ; worse right side ; furious delirium ; tries to escape ; incessant incoherent talk ; screaming ; virtigo ; reeling as if drunk, heat in head ; bloated appearance ; eyes wide open ; staring ; pupils dilated, some times insensible to light ; conjunctiva injected, double vision are loss of vision, tongue swollen, dry, moved with difficulty ; dryness of the mouth ; difficult speech or speechless ; difficulty in deglutition ; violent thirst, desire for acid drinks ; nausea, vomiting ; hiccough ; abdomen distended and hard ; stools black, smelling like carrion, or discharge of coagulated blood from the anus ; dribbling of urine, or suppression of urine and stools, pulse is small, irregular sometimes trembling and imperceptible breathing short and difficult. It will be indicated in acute or subacute stage of the disease with coma of

Dose.—May be used in all potencies.

Opium.—Drowsiness ; complete loss of consciousness ; slow stertorous breathing ; delirious talking with eyes wide open ; deep coma, face pale, half closed glassy eyes ; pupils contracted and insensible to light ; tongue dry, black or white, difficult articulation ; paralysis of tongue, inability to swallow ; loss of appetite, violent thirst, vomiting of food, of green substances or of blood ; hiccough ; distension of abdomen ; involuntary, diarrhœic stools, black fetid ; or obstinate constipation ; violent griping and cutting in the abdomen, retension of urine ; pulse slow, weak, irregular, beat of the heart cannot be felt ; coldness of the extremities, like stramonium it will be indicated in some cases of the disease.

Dose.—6th to 30th.

Carbo animalis.—Acts specially upon the glandular system ; the swelling is usually hard and indurated but suppuration and ulceration may take place ; the glands of the neck indurated, swollen and painful ; the glands of the groin are also swollen and hard and suppurated ; bleeding from the nose ; the gums are red, swollen and painful. This remedy will be indicated in mild cases with glandular enlargement or when the acute stage is over.

Dose.—6th to 30th potencies.

Carbo veg.—Should not be entirely lost sight of, when the vital forces of the patient have become nearly exhausted, body cold, distended abdomen ; pulse intermittent thready cold clammy sweat ; great debility ; fainting-like weakness ; swelling ; induration or suppuration of the lymphatic glands ; hectic fever with sallow compexion or with typhoid symptoms.

Dose.—12th or 30th.

Hepar sulphur.—Acts especially on the lymphatic glandular system producing enlargement and suppuration types as well as in subacute stage of the disease. It has wonderful effect in promoting as well as in checking suppuration when administered in proper time.

Silicea.—Acting upon the lymphatic glands produces their enlargement and suppuration. It has the power to control inflammation of glands and when they are suppurated to moderate the secretion of pus. The swelling of the cervical glands with chilliness ; swelling of lips and of the tongue ; swelling of the submaxillary glands, very painful ; deglutition also painful ; tonsilites ; inguinal glands are swollen and painful to touch ; swelling of the glands of the neck ; stitching pain, worse right side ; swelling of the axillary glands, biting and drawing pain in them. With the other characteristic symptoms of the drug, it is likely to be indicated in glandular types of the disease after the severe acute stage is over.

Mercurius Cyanatus.—This powerful poisonous preparation of mercury will certainly be indicated in some types of the disease ; fever at night with sleeplessness and severe pain in the head ; great thirst ; nausea aud vomiting ; vomiting of bile ; tongue swollen with red edges ; salivary glands, gums and tonsils are swollen, deglutition difficult ; fetid breath ; bleeding from the nose ; cerebral congestion contracted pupils ; extremities cold ; loss of consciousness syncope ; sudden failure of the heart. It is a valuable remedy for tonsillar and cervical types of the disease as well as in intestinal type with prostration, putrid, bloody stools ; hœmorrhage from the bowels ; collapse ; and in Nephritic type with diminished secretion of urine ; presence of albumen or blood in it.

Dose.—6th dilution or trituritiom and upwards.

Mercurius Cor.—Chilliness, great heat of the skin ; extremities cold ; yawning and stretching ; sleepiness ; sleeplessness at night ; pulse small, intermittent, rapid and irregular ; face flushed and red ; frequent bleeding from the nose ; tongue coated with thick white mucus ; or tongue swollen red and dry ; gums swollen and bleeding from them ; violent frontal headache ; great swelling of the throat ; threatened to suffocation ; swelling extended to the neck and head ; submaxillary and salivary glands are swollen considerably and painful ; inguinal and axillary glands are tender and tendency to swelling ; incessant green, bilious vomiting ; vomiting of blood ; great pain in the region of the stomach ; cough with expectoration of mucus tinged with blood , stitching pain , difficult respiration , abdomen distended, frequent discharge of blood per anus ; countenance pale, anxious ; great debility ; trembling , convulsive twitching , delirium stupor , coma , cold clammy perspiration. It would be indicated in glandular types of the disease.

Phytolacca Dec.—Is a vegetable substance which acts like Mercury on the glandular system ; headache ; feels soreness in all muscles ; swelling and hardness of the glands of the neck, worse on the right side ; violent vomiting of clotted blood ; great exhaustion and prostration , convulsion &c. In some stages of the disease this may be useful especially in glandular types.

Dose.—It should be given in low potency.

Apium Virus.—Would be indicated in Nephritic type of the disease, with scanty, high coloured urine ; frequent desire to urinate with passage of a few drops, or urine suppressed ; children with piercing shrieks ; loss of consciousness ; delirium ; stupor &c.

Dose.—6x. trit to 30th.

Belladonna.—May be used in some cases. Indications are :—Furious delirium with screaming out and violent efforts to escape from the bed and house ; face bright red ; pupils dilated, eyes injected ; full of fear ; intense headache with lancinations in back part or top of head ; vertigo with stagdisturb sleep; heavy snoring sleep with twitching of limbs and screaming out; tongue red hot dry papllæ inflamed and much swollen; speech difficult and stammering; reddish spots like fleabites on chest, abdomen, face and neck; constipation or watery profuse diarrhœa; urine scanty with or without sediment; sense of weariness and heaviness in limbs; cold feet.

Dose.—Generally lower potencies are used.

Hyoscyamus.—Is rarely used with these indications:—profound stupor, but when aroused answers correctly; patient, as it were, lives an inward life, full of delusions and hallucinations; delirium continues while awake, and sees and converses with persons who are not present; indistinct and muttering loquacity; hyperasthesia of skin, patient will not remain covered; thirst only wanting during chill; high fever with cool face and cold extremities; muttering with picking at bed-clothes and subsultus tendinum; eyes red sparkling, staring rolling about squinting; distorted face, stupid expression; sordes on lips, tongue and teeth; tongue red brown, dry, cracked, paralysed; foul breath; involuntary micturition, urine leaves large streakes on the sheet; suppressed secretion or retention of urine, paralysis of sphincters; involuntary and unnoticed defecation; pulse quick, rapid, irregular; hypostasis of lungs with impending lung paralysis and snoring rattling breathing, aggravated in the evening; grating of teeth; sleeplessness or constant sleep with muttering; roseola spots on chest and abdomen; painless paralysis and torper of organism.

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INSTRUCTIONS

FOR

HOSPITAL ASSISTANTS

ESPECIALLY FOR THOSE SERVING IN THE JEYPORE STATE.

BY

Brig.-Surgn.-Lieut.-Colonel

T. H. HENDLEY, C. I. E.,

Residency Surgeon and Superintendent of Dispensaries and Vaccination, Jeypore, and Administrative Medical Officer, Rajputana.

CALCUTTA:
PRINTED AT THE CALEDONIAN STEAM PRINTING WORKS,
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Instructions for Hospital Assistants.

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HINTS
FOR THE
GUIDANCE OF HOSPITAL ASSISTANTS.

General Remarks.—During the course of my inspections I have noted many things which I think require attention on the part of Hospital Assistants. Many young men seem to think that all they have to do is to pass their examinations at the Medical Schools, and then to get charge of a dispensary, after which they can sit at ease for the rest of their lives, and, perhaps, never even take the trouble to open a book, or make any effort to keep up or improve their professional knowledge. This is a very great mistake, especially in the case of men who are responsible for the lives and health of their fellowmen. Such persons should be punished by removal from their appointments.

Examinations.—One way in which men of this class may be known is by their failure to go up at the proper time for their professional examinations for promotion. Excuses are constantly made by lazy and ignorant men. One will say he has been ill, another that he has been too busy, while a third alleges that his family troubles have prevented him from working for his examinations. Now it is a very curious circumstance that the really busy men usually pass with ease. Why is this? Because a man who does his work with all his power, and regularly reads the medical papers, and his professional books, for which even the busiest man can spare a few minutes every day, need hardly read any special books at all to pass the examinations for promotion.

These examinations are so arranged as to test the real knowledge of a Hospital Assistant, and not that which he can cram by reading a few medical works. The perusal of medical papers can be obtained by all Hospital Assistants who are serving in the Jeypore State without charge. The

Lancet, *British Medical Journal*, *Indian Medical Gazette*, and the *Indian Medical Record* are sent from the Office of the Medical Department at Jeypore to all who read and understand English well enough, and the principal vernacular papers will be supplied to those who do not read any language but their own mother tongue. There is also a good library of medical books, and any work will be lent from it to a Hospital Assistant for a reasonable time, not to exceed one month, so that he can read up any special subject. The ordinary text books cannot, however, be lent out, as it is the duty of medical men to provide these for themselves. In Jeypore it is endeavoured to give men, who have not had recent opportunities of seeing much surgery, an opportunity of spending a few months on reserve duty at the Mayo Hospital. When, however, men come into Jeypore they must expect to lose a little money as the State cannot be put to extra expense to enable any one to pass an examination for promotion. Moreover, at the end of the time for which they have been permitted to come in, they will have to return to their old charges without making any application for extension of the period. There is, therefore, no excuse whatever for a Jeypore man who fails to go up for his examination at the right time. I am glad to find that only one man in Jeypore has failed to do his duty in this matter.

Qualification in the English Language.—Some Hospital Assistants think that if they can manage to read an easy sentence or two, and copy an ordinary letter, that they ought to be allowed to pass. This is a great mistake. No man should be allowed to get his certificate of English qualification who cannot understand with ease ordinary conversation in that language, and carry on official correspondence in it. A man who cannot work out the average number of nights in bed of soldiers in a regiment cannot be considered to have qualified in arithmetic, nor can the man who makes ten or more separate mistakes in dictation be held to have succeeded in that subject. Hospital Assistants should take every opportunity of talking with Europeans, and of reading professional journals, so as to familiarize themselves with the sound as well as with the idioms of the language. Some men, even when they know English fairly well, are very careless in writing it, and especially in preparing their official correspondence. They should remember that letters which are not easily read may not be read at all, so that, if the subject is of a private nature, they will perhaps be put to much personal inconvenience, and if it is of a public character, they may run the risk of being severely reprimanded, or may do considerable injury to others.

Correspondence.—As a rule all letters should be answered on the same day that they are received; but, if this is not possible, the earliest opportunity should be taken of replying to them. If questions are asked in a letter great care should be taken that they are all answered fully, and in regular order, so that unnecessary correspondence may not be caused. Every letter should be properly numbered and dated, and a copy of it kept in the book provided for the purpose. Signatures should be very clearly written, and the ink which is used should be of good quality that is bright and clear. The envelopes should be carefully addressed and be strong. The letters should have at least a quarter of the page left as margin. The Jeypore Durbar has given orders on the subject of correspondence with the officials of the State which should be carefully followed. To a Nazim the Hospital Assistants should write as follows: "Janab Nazim Sahib Makhdum makaram banda—dam zilkum, pas az salam niyaz—bakar sarkar arz hai." For Tehsildars: "Janab tehsildar Sahib karm farmai banda—dam inayat hu pas az salam shauk bakar sarkar ank." The Nazim replies thus: Tawajh' farmai banda—Hospital Assistant sahib dam inayat hu pas az salam shauk bakar sarkar ank." From Tehsildars: "Janab doctor sahib karm farmai banda—dam inayat hu pas az salam shauk bakar sarkar ank."

Leave.—When leave is required Hospital Assistants should make early application as only a certain number of men are available to act for them. Moreover, applications are generally complied with in the order of their reception in the office of the Administrative Medical Officer in Rajputana. All applications must, of course, be submitted through the Hospital Assistant's immediate superior. Hospital Assistants, Compounders, Vaccinators, and Hospital servants frequently overstay their leave; this is contrary to the regulations and involves forfeiture of pay, reduction to half pay, or even in some cases loss of their appointments. In case of sickness when on leave a medical certificate must be produced from a Civil Surgeon, which must be sent in, if possible, at least ten days before the expiry of the leave, so that arrangements may be made for the continued performance of the applicant's work. Every applicant should remember that when he overstays his leave another man, in all probability, is disappointed and unable to get away, sometimes greatly to his inconvenience and loss. Instances sometimes occur of subordinates, such as Compounders or Dressers, going off without waiting for sanction of leave. This cannot be allowed. In very urgent cases in Jeypore Hospital Assistants are permitted to let men go provided they can be recalled if necessary, and the case is one in which there is a sudden illness or death in the man's family, but they will be held responsible for the performance of his work. Subordinates of this class must not leave their stations without permission. Men of this class in Native State service are not entitled to leave of any kind without providing a substitute althouh it may be granted at the discretion of the Medical Officer if no additional expense is caused to the State. Such leave will only be granted to men of good conduct.

Conduct as regards subordinates and hospital servants.—There are some Hospital Assistants who can never keep on good terms with their assistants. In such cases it is generally because the doctor has a bad temper, or because he wants the man to do his own private work for which he is not paid. The subordinates are paid for public work only, and any Hospital Assistant who compels them to do his own private work is liable to punishment. Men of this class should be treated with kindness and consideration. At the same time they must not be allowed to perform the duties of the Hospital Assistant himself. I, and most Medical Officers, could name dispensaries at which the compounder does nearly all the work. The Hospital Assistant who permits such an irregularity should, of course, be removed from his responsible position. Some men allow their subordinates to keep the instruments and drugs almost entirely in their own hands, so that at inspection times they do not know where things are. A bad and lazy doctor is often discovered on such an occasion.. The compounder soon begins to think that he knows a good deal, and perhaps treats persons who are seriously sick and does them harm. Hospital Assistants are not permitted, under any circumstances, to allow compounders or dressers to prescribe for patients, as by doing so, not only may much harm be done, but the reputation of the dispensary will surely suffer. Compounders should be carefully instructed in their duties and asked from time to time the doses of different medicines. Especial care should be taken that they know the different poisons and their doses, also that they keep their scales, bottles and other articles clean, as well as nstruments if they are in their charge. The Hospital Assistant is, however, held personally responsible for the cleanliness and careful preservation of every thing in the dispensary.

Courtesy to Raj or State Officials.—Most Hospital Assistants, I am glad to observe, get on very well with the other officers of the State, but there are other men who never seem to be able to keep on good terms with anybody. Such men are not fitted for the medical profession, and are of no use in Native States or indeed in any position of independence. I must, therefore, insist that all Hospital Assistants and other men serving in the Medical Department must be on courteous terms with all officials, and that they must support their authority in all lawful ways. It has been decided that when the Hospital Assistants go into the Nazim's Court to give evidence they shall be allowed the same position as a Tehsildar would have.

Courtesy to the public generally.—I have referred at length to the manner in which officials should be treated, but it is quite as important that the general public should always be treated with equal respect and courtesy. If the people who go to the dispensary are not properly treated in a very short time there will be no patients at all. I find that the men who do not get on with their subordinates are generally those who are unpopular with all classes, and probably for the same reasons, *viz.*, they are either bad-tempered individuals or they have been badly brought up, and ought never to have been doctors at all. Such men raise their voices and speak in harsh tones to the poor, and, I am sorry to add, particularly to women. There are some men still serving in the Medical Department who do not seem to be able to speak to a woman with decency, who always speak harshly to them and often treat them, even in my presence, as if they were animals and not human beings. On the other hand there are many men whose dispensaries are well attended by women and children, because they are sure of being treated with respect and kindness by the medical staff. Any man who fails in this respect will be severely dealt with.

General Education.—The Hospital Assistant should remember that he is looked upon as a learned man by the villagers and small shop-keepers in a country town, and that, if he is to keep up this character, he must read, not only professional books, but others on general subjects. If he does not do so, the people will soon find out that he is little more intelligent than themselves, and cease even to believe in his medical knowledge. In an agricultural community the villagers will naturally feel very much indebted to any one, who can give them a little friendly advice on the management of their cattle when they are sick, or when any accident occurs to them. For this reason I have placed a copy of a simple work on the diseases of domestic animals in all the Jeypore dispensaries, and intend to add another book on the disorders of horses and, perhaps, a third on the camel. These works are written in the vernacular languages ; there is, therefore, no excuse for a Hospital Assistant, who does not read them, and who does not place the knowledge thus obtained at the disposal of the poor farmers who live near him. A man, who shows himself a kind friend in such matters, will be treated with confidence when it comes to his opinion being asked in cases of sickness amongst the people themselves. Some men are rather too proud to give help in such cases, but this is an unkind and foolish way of acting. Every man should be pleased to do good when it is in his power to do so. Our Hospital Assistants are often asked such questions, and they will always find that I am ready to help them to give satisfactory answers to such enquiries if they refer them to me. I shall shortly also send for suspension on the dispensary walls a set of pictures which have been published to show the evils resulting from the presence of weevils in grain or "rust" on corn. At the foot of these pictures will be found the best modes of treating all these pests. Here again will be an opportunity of helping the poor peasant and of saving him from much loss of money.

All this does not require much additional knowledge or much expenditure of time in reading, but it makes a man useful and trusted as well as esteemed by his patients.

Dispensaries.—Hospital Assistants are reminded that the dispensary ought to be looked upon as the centre of cleanliness in the town.

If the hospital is not perfectly clean how can it be expected that other houses in the place will be kept in order ? Some men take no pride in their dispensaries. The walls are never, or but very rarely, swept, and dust and dirt are allowed to lodge everywhere on the tops of the cupboards, behind pictures, or medicine bottles. There is no cloth on the table at which the doctor sits when he sees and prescribes for the sick patients, the dispensary books are covered with ink stains, the shelves in the walls are dirty, and everything bears a neglected appearance. It was in a dispensary of a man of this kind that I once found cows stabled in the in-patients' room. A common thing is to find that the Hospital Assistant uses one of the public rooms for the accommodation of his family. As there is abundant space in all our dispensaries for a man with a family this practice is absolutely prohibited. The walls, ceilings, and floors of the dispensary rooms should be swept and cleaned every day, and the furniture should also be kept scrupulously clean, and application should be made whenever the walls look dirty to have them limewashed. In case of trifling injuries to the plaster or stonework of the building, early application should be made for repairs to be executed. In the same manner any breakages or deficiencies in the furniture or equipment should be at once reported, so that all defects may be remedied at the earliest opportunity. In the Jeypore Medical Department a form is filled up once in each quarter by every Hospital Assistant, who has to answer a number of questions regarding the equipment of the dispensary, its condition as regards repair, the state of the instruments, as to whether there is a deficiency in the supply of drugs, to note on the sanitary condition of the town, the conduct of his subordinates, and the general welfare of the people in the place. If it is afterwards found, at the usual inspection of the institution, that damages to the building or to the equipment exist of which no report has been made, the Hospital Assistant is held to be responsible, and may have to pay the cost of repairs or of replacing missing or damaged articles. This is quite right, as the case then becomes one of neglect of duty, or of carelessness, and not of accident. Breakages will occasionally occur, and, when it is found that no blame can be attached to any one, the State is always ready to pay for them. Most of our Hospital Assistants have sufficient self-respect to dress in clean clothes, but this is not always the case, and it is very common to find a compounder or dresser wearing the filthiest garments. For this there is no excuse whatever, since, however coarse the garments may be, they can easily be kept clean ; moreover, a dirty hospital attendant is not fit to look after the sick as we all now know well that the only way to heal up wounds is to keep them perfectly clean, and this can never be done by a man who has to dress them with dirty hands, or who is likely to touch his own filthy garments, as he is sure to do while he is dressing them. The Hospital Assistant should make a practice of having, on a small stand close beside his table, a basin of water in which he can wash his hands every time he touches a patient, especially when the man is suffering from a skin disease. In this way medical men, not only do not often suffer themselves from communicable disorders, but they do not carry them to other individuals.

Cleanliness of Instruments and Appliances.—The greatest care should be taken to keep all the surgical instruments in good order and free from rust. They should be carefully washed and cleansed after each time of use and before they are put away.

The following are extracts from instructions issued from the Surgeon-General's office regarding the preservation of instruments.

STEEL INSTRUMENTS.—All articles of this kind after use should be carefully washed and wiped dry with a soft cloth. They should then be placed in the sun or exposed to artificial heat in any manner most convenient for an hour or so. This heat should be about 140 F. In applying it, care should be taken not to expose to it too suddenly handles which happen to be made of wood, bone or other friable material. They may be placed on a sheet of tin which is suspended over a lamp. When thoroughly dry, and while still warm, the steel part of the instrument should be plunged into Rangoon oil; the superfluous oil should be allowed to drain off before replacing the instrument in its case. In doing so care should be taken not to touch the steel parts of instruments with the fingers. Those made wholly of steel should be taken up with forceps. Wooden instrument boxes and leather cases should be occasionally aired in damp weather; this should be done in the sun.

GUTTAPERCHA TISSUE—Can be kept soft and pliable for a long time if completely immersed in cold water.

OILED SILK—Is best kept in an open tray freely exposed to air in a cool place, the sheets being first dusted on both sides with very finely powdered, sifted chalk, which should be lightly rubbed on.

GUM-ELASTIC ARTICLES—Such as catheters, stomach pump, tubes, etc., should be hung up in the air in a cool place and not be shut up in boxes.

The teeth of toothed instruments ought to be cleaned very thoroughly, and forceps locking by catches ought to be opened widely and well cleansed. Before an operation the instruments must be wiped and then immersed in a 1-20 carbolic lotion for about an hour. If the operation is a very important one it is well to boil the instruments in water for twenty minutes or half an hour.

The instruments must be kept in the tray of carbolic solution all the time the operation is in progress, unless they are actually in use. The whole instrument must be immersed in the fluid, and it must not be placed for one moment on the table or anywhere but in the tray when it is not in the operator's hand. In all operations the surgeon's and dresser's hands must first be made scrupulously clean by washing them in a 1-20 solution of carbolic acid or in a one-in-ten-thousand solution of perchloride of mercury. The Hospital Assistant must remember that it is the aim of all good surgeons to make even the most simple operations aseptic; he should, therefore, be as careful in small operations as in large ones, and, even in opening small abscesses and whitlows, he should see that his knives have been properly cleaned and purified. Many men seem to think that if they wipe a knife on their own pugri or handkerchief it is enough, just as in the case of a Hindoo they drink out of the lotah of a man of their own caste or from the hand of a Brahman. A Brahman unfortunately can be as dirty as even a low caste man. Very great care should be taken to wash out and dry the glass measures which are used in making up prescriptions. If a man is careless in this matter he may, perhaps, give a poison when making up a new prescription because it has been left in the glass since the last time it was used. In the same way scales must be carefully cleaned, and every now and then they should be tested to see if they are true or not. This is very important and is often neglected. Spatulas which are used for making ointments, and the ointment slabs also, should be well wiped and cleaned every time they are used to be in readiness for preparing a fresh ointment. Similar care should be taken in making pills. To use a pill slab for mixing a curry powder, as I have seen done, is a nasty trick, so is the employment of a pestle and mortar for the same purpose without cleaning them. Dirty pieces of paper should not be used for wrapping up powders or ointments. Acids and other strong drugs should not be put into porous bottles. Bottles should not be given to patients except in case of urgent necessity. When they bring their own bottles it should be seen that they are clean before medicines are put into them, and all bottles in which drugs are put that are likely to spoil if exposed to the air should be corked.

POISONS.—All bottles which contain poisons should have a distinguishing mark of some kind, and the patients should be told to be very careful not to leave liniments or poisonous medicines of any sort in the way of children. The best way is not to give poisonous drugs of any kind in large quantities to ignorant people who cannot read; liniments may be made disagreeable by adding to them something which has a nauseous taste or smell so that no one would be likely to drink much of them. Strong poisons may also be given in a very much diluted form so as to lessen the risk of taking an overdose of them. It is laid down in the official regulations that the poisons should be kept under lock and key in a closed cupboard or almirah. Every bottle or pot also which contains a poisonous drug must bear upon it a poison label of a bright colour, and it is advisable also that the usual doses in which the poison is used internally should be written distinctly on the stock or dispensing bottle. I recommend this also for all dispensing bottles, and that the names of the drugs and the doses should be thus clearly shown upon them in the language of the compounder as accidents may be sometimes prevented in this way. The dates on which new supplies of drugs are received should be marked upon the bottles, pots, or jars, so as to ensure that the new supply is not put on top of the old one, as in that case after a short time perhaps such articles as tinctures would greatly increase in strength and so become dangerous, or in other cases spoil or even become useless and inert.

Prescriptions.—Hospital Assistants and Compounders, unless they thoroughly understand all the words and symbols in a prescription, must not make it up. Moreover, if they think that any dose is excessive they must refer the prescription to the prescriber for further orders. All prescriptions must be copied into the book which is provided for the purpose if the original is to be returned. The man who makes up the prescription should, before he returns it, mark upon it the date upon which he made it up. This should be done on every separate occasion. If there is a dispensary stamp it should be used for this purpose. All prescriptions should be legibly written. In India the directions should be given in English, and not in the Latin tongue, if the compounders understand English, otherwise they must be in the vernacular. Only

Hospital Assistants and specially licensed passed compounders are allowed to make up prescriptions which contain poisons.

Medical Cases, their diagnosis and treatment.—Failures to discover the exact nature of a disorder are generally due to want of care and not to ignorance. The man who thinks he is very clever often jumps to conclusions, whereas the wise physician neglects nothing which will assist him in forming a correct opinion. Medical students are taught to take cases in an orderly way, and it should be the aim of Hospital Assistants to take all their important cases in the same manner. Instances are often seen in which it would appear that a physician makes a correct diagnosis by instinct, and without undergoing all the labour to which I have referred ; but the truth is that the rapid glance, which reveals so much, is the result of enormous experience and most careful and diligent case-taking in the past. Men go on treating symptoms because the patient suffers much from them, whereas if the cause of these symptoms is removed it will at once lead to their disappearance. For example, children, who are suffering from disease of the hip-joint, most frequently complain of severe pain in the inside of the knee, and do not seem to feel that there is any thing wrong with the former joint at all. A careless man looks after the knee and does nothing for the part which is really in fault. Many such illustrations might be given, but it is hardly necessary to add more. Remembering that coughing is common to many affections of the chest and even of other organs, it will not do to give a cough mixture to every one who makes such a complaint, but the cause in each instance must be most diligently enquired into. In giving medicines it is quite unnecessary to combine a large number of drugs together Some men seem to think it is the proper thing to show their learning by putting it all into one prescription. As a rule there should be only one drug of great activity or, perhaps, two, in which case it must be seen that the two are not incompatibles. A drug may be added to disguise the taste of the principal ingredient, and another may be employed to improve its appearance, and the whole may then be given, in what is called the vehicle, so that it may be diluted in order that it may be taken with comfort, and perhaps even a certain amount of pleasure. Above all things, the doctor should avoid giving unnecessarily large quantities of nasty medicines, and should study the peculiarities of his patients. Thus, for example, some people cannot system being upset, or a rash breaking out on their bodies. All these things should be studied.

One of the ancient medical authors long ago wrote that the best physician is he who cures his patients quickly, safely, and pleasantly ; this should be the aim of us all. It is very important to remember also that the physician must be able to show to the sick that he himself believes in the efficacy of the medicines he is giving. A man who gives quinine and other drugs of that kind in malarial fevers to his patients, but who, if he suffers from an attack of ague himself, resorts to old wives' potions and calls in a quack, cannot expect to be believed—in short he is a knave and a hypocrite as well as a liar. I am sorry to state that I have met many such men during the course of my service. One of the surest signs of an ignorant medical man is his use of quack, or so-called patent medicines, of the composition of which he is ignorant. A good many men in India cannot divest themselves of the idea that their art is a mystery. It is nothing of the kind ; all our knowledge of medicine is the result of most careful enquiry and of innumerable observations.

All cases of accident, convulsions, colic, or others of such like urgency should be attended to immediately. Care should be taken to show interest and anxiety in all cases, and to avoid indifference in any. In examining the sick be careful to avoid inflicting pain, and be gentle in handling wounded or painful parts. In examining a sick child be especially careful to see him in a good light. Do not speak in a disparaging tone of the previous treatment of the patient by another medical man. You cannot know. what the condition of the patient was when he was seen by your professional brother, nor can you be sure that he was made acquainted with all the facts regarding him. Remember that you have no right to talk about the cases of your patients, and that, if you do so, you will soon lose their confidence, and that of your superiors also, besides having done a thing which may possibly lead to your being punished. You cannot be sure that a fever is not one of the eruptive ones until the spots or other local signs appear. This should make you very careful about your diagnosis in all fever cases. Never guarantee success, or certain recovery in any illness, as no one can be sure of what will happen, because even a scratch may end fatally. Never conceal the presence of a contagious disease from those who are likely to contract it. Do not be always trying new remedies, but learn to depend upon a few well tried ones rather than upon a very large number of drugs.

The best workman is he who can do the most with a few tools, with the exact use of which he is thoroughly acquainted. Every year a number of new drugs are introduced, but how few of them are found to have established a permanent reputation. A great surgeon it was, I think, who once said : Give me opium, quinine, and calomel and I will guarantee to do all or nearly all that can be done with drugs. Most certainly with about twenty drugs the doctor, who knows his business, is well prepared to undertake the treatment of nearly all the cases of illness that may be brought to him. Remember that some diseases kill very quickly, and that it is no good to order, in such cases, drugs which are slow in their action. Moreover, you should never leave long intervals between the doses for patients who are suffering acute pain. Let the first examination of every patient be very thorough, and never neglect the following five most important points : (1), to feel the pulse; (2), examine the tongue ; (3), inquire about the appetite ; (4), the sleep ; and (5), the state of the bowels. Do not prescribe large quantities of medicine at one time as you may have to make changes, and it is not right to waste, and besides it tends to induce the patient and his friends to believe that you do not quite understand the case. It is a common failing of Hospital Assistants to change their prescriptions because their patients wish them to do so, or because some one else has suggested that there is something better which ought to be tried. A man, who shows that he has so little confidence in himself and in his own prescriptions, will soon find that his patients will cease to have any confidence in him also. Never write a prescription carelessly or talk, or listen to conversation, while writing it. Read the prescription over before it is given to the dispenser. Hospital Assistants and licensed compounders must always make up prescriptions which contain poisons with their own hands. Seek for a consultation in all cases which you do not understand if there is any medical man within call. It is as well to let patients understand that a remedy which is useful for a sick man at one time may be improper for him at another, or even do him great harm ; it will moreover be very improper to use it at any time for another person as, although his case may seem to the layman to be of the same character as that for which the prescription was given, to the eye of the physician it will, perhaps, be found to be altogether different. This is the principal danger to which persons who use quack or secret remedies are exposed.

Quack medicines.—A drug may have done much good in a particular case, but who but a physician can tell that other cases in which it is employed are quite the same. For example, a man suffers from vomiting and constipation, which are due to dyspepsia or some such comparatively trifling cause, in which case a purgative may be the right remedy to employ ; on the other hand, a patient may have exactly the same symptoms, and yet be suffering from one of the most dangerous disorders, *viz.*, strangulated hernia, a bad form of rupture of the bowel in which the use of purgatives will not only aggravate the disease, but in all probability kill the patient outright. Most people are easily taken in if their curiosity is aroused, and they believe that if a thing is kept secret there must be some great virtue in it. Dealers in quack medicines trade upon the credulity of the public in this matter, and make huge fortunes out of their folly. If men only knew what the composition of most of the so-called patent medicines is they would never use them ; they would indeed often find that they had used the article itself, though, perhaps, it was sweetened or flavoured in some other way. Here are a few examples of the compositon of popular secret remedies. They are taken from the publication known as *Hygiene* :—

The following is stated to be the composition of *Holloway's Pills* : Aloes 62 grains, Rhubarb 27 grains, Saffron and Glauber's Salts of each 3 grains, Pepper 7 grains. *Holloway's Ointment* is also said to be composed of Olive Oil 62½ parts, Lard 50 parts, Resin 25 parts, White Wax 12½ parts, Yellow Wax and Turpentine and Spermaceti of each 3 parts. *Sequah's Oil* consists of a mixture of two-thirds turpentine and one-third fish oil, scented with a few drops of oil of camphor. *Sequah's* Prairie Flower contains in two ounces water, 735 grains Aloes, 105 grains.

Proper time to use Medicines.—Alkalies should be given before food. Iodine and Iodides should be given on an empty stomach. Acids as a rule should be given between the digestive acts. Acids may be given before food when prescribed to check the excessive formation of the gastric juice. Irritating and dangerous drugs should be given directly after food, such as the salts of arsenic, copper, zinc and iron, except where local conditions require their administration in small doses before food. Oxide and nitrate of silver should be given after the process of digestion is ended. Metallic salts, especially corrosive sublimate, also tannin and pure alcohol, should appear in the stomach during its period of inactivity. Malt extracts, cod liver oil

(*Medical and Surgical Reporter*), Acids should not be given too soon after calomel has been administered.

Bazaar Medicines.—Very great care is to be taken that bazaar medicines are in a perfectly fresh and satisfactory state, and to ensure this Inspecting Officers have been requested to examine them as carefully as possible when they visit dispensaries; but this does not prevent Hospital Assistants from being held to blame if their supplies are not in a proper condition. If good drugs cannot be supplied locally they will be sent from head-quarters. Many drugs are likely to become inert if kept, as they frequently are, in paper. Tins, boxes, or bottles should be used. In no case should poisonous drugs be kept in papers or be sent out in them. In the course of inspections I have seen a dangerous drug, such as corrosive sublimate, wrapped up in a piece of cloth. All medical officers and subordinates should remember that the rules for the safe custody of poisonous drugs are intended to apply as much to indigenous drugs as to those that come from Europe. Animal products require special care. Only the best oils or fats should be used for making carbolic oil, carron oil, or ointments, &c. Most ointments are sent out from the Central Stores, but if made locally only mutton fat and the purest oils should be used. Mixed fats of the goat and sheep are not to be used as they are sure to be impure. Lanoline and vaseline are good but somewhat expensive substances. No other kinds of fat are permissible.

Infusions and decoctions are sometimes very badly made in dispensaries. The Pharmacopœial instructions as regards these preparations should be very carefully followed. The infusions should be allowed to stand exactly the proper time and be of exactly the same strength at all times. In the same way the decoctions should never vary in strength.

Purchases of drugs should only be made in the bazaar from reliable and very careful men. Pansaries are sometimes very careless in the storing of poisons. Terrible mistakes have been made by them, and it is to be earnestly hoped that, before very long, strict regulations will be made by all Governments to control them, and thus prevent the occurrence of such dangerous accidents in future. It should be ascertained that the different articles are not adulterated. Brahmins, Jains, and Bunniahs often request to be supplied with dry medicines. This should be done if possible. Similarly Musalmans should be given drugs which are free from spirit.

Personal habits of Hospital Assistants and subordinates.—It would hardly be thought necessary to refer to the dangers of excessive drinking if it were not unfortunately true, that not a few men have ruined themselves and been dismissed from the service for this cause.

No man who drinks to excess, or against the rules of his caste or religion, can be trusted with the charge of a dispensary. The use of pan, while on duty, is to many persons a source of annoyance, and as careful and delicate investigations have to be made, especially where women are concerned, the Hospital Assistant would do well not to eat this condiment when he is in his dispensary. It is hardly necessary to state that the excessive and improper use of bhang, opium, and similar articles is to be avoided.

There is a standard of gentlemanly behaviour in all countries which our doctors, I need hardly add, should be very careful to cultivate.

They should also see that their assistants do not offend against the laws of propriety. One very common fault alone I will allude to here, and that is the dirty habit of spitting pan on the walls and floors of rooms.

Meteorology, and the reading of Meteorological Instruments.—In many places Hospital Assistants are expected to read the barometer, thermometer, and anemometer, and to record the direction of the wind and measure the rainfall. In special cases, where an unusual amount of work has to be done, and the responsibility is great, they may receive special allowances for this work. The most important point is to take all the observations at the appointed times. A man may think that this is a great nuisance, and that he will not be found out if he is a few minutes late in making his observations ; but, so certain are many of the meteorological phenomena, and so true are many of the indications afforded by the readings that are taken in neighbouring stations, that the Meteorological Reporter to the Government of India can at once detect when a man has sent in a false observation. It is, therefore, not only wrong but unsafe to commit such faults. If any man in Rajputana does not know how to read the instruments he can be taught, when on the reserve at Jeypore, or at any time at most of the great capitals of Rajputana. All instruments should be kept perfectly clean. The bottle in the raingauge, and the funnel at the top, should be examined from time to time in the hot season, and freed from dirt and dust. The top of the gauge should be perfectly level and circular as well as free from indentations. The wind vane should be looked at, and if it does not move freely, or point in the right direction, it should be examined, and oiled, or freed from dirt, as may be necessary. The rain gauge must not be too near buildings or trees, and if boughs of trees or long grass are close to it they should be cut. All entries must be made at the actual time the readings are made, and not when the observer has gone into the house or hospital. The Hospital Assistant has no right to depute the duty of making the observations to a compounder, or other person, unless he has to be absent on professional duty at the time the readings have to be made. It is as well to teach the compounder to read the instruments, but, whenever he has to take the readings, a note to that effect should be made on the record. If an instrument appears to be damaged a report should be made immediately to head quarters. All meteorological reports should be sent in at the earliest moment that they are due.

Vaccination.—In some places Hospital Assistants are required to vaccinate children, and in others to inspect the work of the vaccinators who are at work in their neighbourhood. In all cases they must make themselves thoroughly acquainted with the subject and be themselves expert operators.

In Rajputana they are only allowed to use the needle, and no other instrument may be employed. They must make three good marks, no more and no less. The marks are to be made on the arm, and no child is to be vaccinated when it is sick in any way, and especially if it is suffering from a skin disease. No lymph is to be taken from a feeble or sickly looking child, or from one whom there is reason to believe is the child of unhealthy parents. No money, or reward, or fee is to be taken for the performance of the vaccine operation unless it has been especially laid down in the rules, under which the operator is working, that a fee is to be paid, nor is a man to receive money or to ask for money to excuse any person, who is obliged by law to have his child vaccinated, from having any such child vaccinated. Any man in Rajputana, who breaks these rules, renders himself liable to very severe punishment.

In Ajmere-Merwarra at present only human lymph is to be used. Human lymph is also generally used in the Native States, but if at any time the rules are changed they must be carefully obeyed. No variation from them will ever be allowed. The parents should be warned of the dangers of rubbing the marks and of irritating them in any way by the application of any drugs or other substances. A few simple directions should be given to the parents for managing any slight inflammation or fever. In Rajputana it is generally the custom to give opium to the children if they are feverish and cry a good deal. The parents may be told that this practice is not a good one, and that the fever and other troubles will soon disappear.

A good vaccinator should rarely have an unsuccessful case. If he chooses his lymph well he will not often fail, but should he do so, he must re-vaccinate the child again from arm to arm, that is he must select a perfect case in a healthy child of suitable caste, or position, and vaccinate the unsuccessful case directly from it. He must do this even a third time before pronouncing that it is impossible to vaccinate the child with success. He must remember that the poor and uneducated have not had the opportunities of learning all the advantages of vaccination that he has enjoyed ; he must, therefore, patiently explain them all to them. He must be ready to meet all difficulties that may be raised, and in order to be able to do this with success must read and study the works that have been written on the subject. Perhaps the greatest crime a vaccinator can commit, indeed which any doctor can commit, is not to practise what he preaches. A vaccinator, who does not vaccinate his own children, is a traitor to his profession, and if detected will be assuredly no longer employed. There have been cases lately in Rajputana in which even Hospital Assistants have thus failed in their duty. One man was detected because his children suffered from small-pox, and, while they were in this condition, he attended the children of other people, and great risk was run of their being affected with that fatal disease. It is not only in vaccination that such treachery is mischievous. I have known men who have given the best drugs and advice to their patients, but have, when ill themselves, gone to the worst quacks for treatment. One man, rather than undergo the pain of a simple operation for internal hæmorrhoids, allowed a quack to apply arsenic to his person, a really far more painful and dangerous procedure than he afterwards found the ordinary operation to be.

A man who is not true to his salt in such a manner is respected by no one, and his advice is not considered worth anything at all.

Bribery.—On this subject there is not very much to be said. It is as well, however, to state that there are not a few persons who have brought forward charges against vaccinators of taking bribes, and against Hospital Assistants of doing the same, especially in police cases. Such offences are not only punishable by the law, but result in dismissal from the service. Sufficient care should be taken in all police cases to commit all matters to writing immediately they occur. The Hospital Assistant must do his duty fearlessly, and state exactly what he sees, and, in giving his opinion in police cases, must be careful not to say or write too much ; he must only state what has come within his own knowledge or what he has seen himself. He must not exaggerate, and must conceal nothing that it is his duty to reveal. If any one offers him a bribe he must report the fact to the head of his department, and in police cases to the police or Magistrate. It has been stated that in some of our large hospitals the poor man finds it not easy to see the Civil Surgeon or even the Assistant Surgeon when he is anxious to do so, without paying something to the chuprasies, compounders, or dressers. It has also been said that poor patients have complained that they were neglected unless they or their friends paid these persons. Although I do not believe that there are many places where such evils exist, it is as well to mention them, so that doctors of all ranks may be on the look-out to stop them. I find it a good plan to halt a moment or two outside the hospital so that every man may know that I have arrived in the building, and may have an opportunity then and there of speaking to me. It is difficult to see how, when this is done, any one can prevent the poorest patient from making his wishes known. Moreover, as every surgeon goes round the hospital wards, the in-patients have abundant opportunities of making complaints if they feel aggrieved.

If a man pays a bribe he is as guilty in the eyes of the law as the man to whom the bribe is paid, hence the difficulty of proving such offences. In order to avoid charges of this kind Hospital Assistants should make it a rule to be accessible to all who come to them, and should not keep any one waiting at the dispensary doors. As far as is possible every thing should be done in public.

Fees and Private Practice.—Hospital Assistants, unless expressly probibited from doing so, or unless they hold appointments in which practice is not allowed, can visit sick persons at their homes and take fees from them. In charging fees Hospital Assistants should remember that most of the people of this country are poor, and that if they ask too much they will not only not be paid, but the probabilities are they will not be called in again. It is much better to take a reasonable amount, and be called in frequently, than to get one large sum and have no chance of earning any more. In Europe it is customary to charge according to the position of the patient, and this is generally supposed to be indicated by the size or rental of the house he lives in. This is not easy to do in India, but in the case of officials the same end is attained by calculating on the salary of the patient which is generally known. . The following are the rules which are in force at present on some State Railways. It must be recollected, however, that all servants of Government are entitled to free medical advice for themselves, and, in the case of certain officers, at their own homes if they prefer to be seen there. Some are to be seen by the Medical Officer, others by the Assistant Surgeon, and the remainder by the Hospital Assistant. " If the salary is Rs. 250 a month or more the fee is, in the case of the Hospital Assistant, 12 annas per visit. If the patient draws from Rs. ~~50~~ to 250 he receives 8 annas. Many men ask 2 rupees for a visit, but it is only in some parts of the country that they get it. For a first visit, and especially to a stranger or person who has not been seen before, it is right that a full fee should be charged, because a great deal of time and care may be required to form a correct opinion of the nature of the case. It is wise, however, not to make such charges after the first visit or to old patients. When several visits are made in the same day the second visit, in most cases, should be charged at a lower rate. A full fee may be charged for work which is done at night, or when the doctor has to go a long distance from home. It is, of course, understood that no Government or State servant is allowed to be absent from his duty or to undertake any private practice which will interfere with the proper performance of his public duty in any respect. No fees are allowed to be taken for work of any kind which is done in the hospital, or dispensaries. Vaccination should also be done on all occasions. and for all classes, without charge unless there is a payment to be made under the law.

It is as well to avoid quarrels about fees. The best way is to decline to attend in future a man or his family if he does not pay what has been justly earned. Some men are willing to pay a high fee for medical aid to a dog, a horse, or a cow, because they are property, and their death, or injury in any way, would cause them direct pecuniary loss, yet they seem to value their own lives or those of their wives and children so little that they grudge a few annas even for their treatment.

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"A Short Description of the Culicidæ of India, with Descriptions of New Species of Anopheles."

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[PLATE 5.]

The following account has been drawn up at Professor Lankester's request with a view to facilitating the work of investigation of malaria in British India. It includes all the known species of Culicidæ found in continental India. Singalese and Malayan species are not recorded, but probably several of them will be found in India.

The species previously described are here only referred to briefly, sufficient characters only being given to enable the identity of the Indian species being made; for this purpose tables have also been drawn up. Full descriptions, references, &c., will be found in the "Monograph of the Culicidæ of the World," published by the Trustees of the British Museum (Natural History).

The following genera are recorded from India:—*Anopheles*, Meigen; *Toxorhynchites*, Theobald; *Mucidus*, Theobald; *Stegomyia*, Theobald; *Armigeres*, Theobald; *Culex*, L.; *Tæniorhynchus*, Arribalzaga; *Panoplites*, Theobald; *Ædeomyia*, Theobald; and *Uranotænia*, Arribalzaga. In all forty-five species of Culicidæ are known, and one *Corethra* (*C. Asiatica*), which is a non-piercing-mouthed genus, scarcely tenable in the family Culicidæ.

This number will probably be doubled in a few years. At present we have no records of *Sabethes*, *Psorophora*, *Megarhinus*, *Trichoprosopon*, *Janthinosoma*, *Ædes*, and several other genera. *Sabethes*, *Trichoprosopon*, and others occur in woods and forests. At present we seem mainly to have received collections of household forms and species found in the immediate neighbourhood of man, from the Indian continent.

It is necessary that other genera than Anopheles, Stegomyia, and Culex should be experimented with in connection with malarial fever, yellow fever, Filariasis, &c., and that *all* species of the various genera should be dealt with. There is no reason, if only *certain species* of Anopheles act as carriers of malarial parasites, why some species of *Culex*, *Stegomyia*, *Panoplites*, &c., should not act in the same way, whilst others of them do not. For this reason, all the Indian Culicidæ are here recorded for reference. Filariasis is carried not only by Culex, but we know also by certain Anopheles and Panoplites, and possibly further experiments will show the same for malaria and other diseases.

It will be noticed that five European species occur in India (*fasciata*, *mimeticus*, *spathipalpis*, *cantans*, and *nigripes*).

No doubt others, as *C. pipiens, A. superpictus,* &c., will be found on further search being made. The most interesting is the presence of *C. cantans* in South India.

Genus ANOPHELES *Meigen*

Table of Indian Anopheles.

A. Metatarsi and tarsi banded.
  α. Posterior tarsi pure white.
  β. Last three hind tarsi and most of the first white.
  γ. Abdomen densely scaly. *pulcherrimus.* n. sp.
  γγ. Abdomen not densely scaly.
    Costa with three small white spots; wings very dark; fringe at apex black. *fuliginosus,* Giles.
    Costa with seven alternate black and yellow spots; fore metatarsus banded in middle. Legs slightly spotted. *Jamesii,* Theobald.
  ββ. Last two hind tarsi white.
    Wings jet black, with five white costal spots and an apical spot. *Theobaldi,* Giles.
  βββ. Last hind tarsus white.
    Legs speckled and banded. *maculatus,* Theobald.
  αα. Posterior tarsi not pure white.
    δ. Costa with two pale spots.
      i. Palpi densely scaled and banded.
        Cross-veins close together; base of 1st sub-marginal cell not under apex of the sub-costal, pale costal spots small. *sinensis,* Wiedemann.
        Cross-veins far apart; base of 1st sub-marginal distant from end of sub-costal; apical fringe pale. Sub-sp. *annularis,* Van der Wulp.
        Cross-veins as above, but base of 1st sub-marginal cell lies just under the end of the sub-costal. *Indiensis,* Theobald.
        Near *annularis,* but the wing-scales less elongated, and a black apical fringe and pale patch at end of lower branch of 5th vein. *nigerrimus,* Giles.
      ii. Palpi densely scaled, but unbanded. *barbirostris,* Van der Wulp.
    δδ. Costa with more than two pale spots.
      ε. Legs with basal pale bands. *gigas,* Giles.
      εε. Legs with apical pale bands, legs speckled. *metaboles,* n. sp.
      εεε. Legs with apical and basal banding. *Rossii,* Giles.
      εεεε. Legs unbanded; wing fringe with three pale spots.

Palpi with two narrow white rings and a minute white tip. *culicifacies*, Giles = *Listoni*, Giles = *Indica*, Theobald.

Wing fringe with more than three pale spots.

Palpi with two broad apical white bands, and a third narrow one. *Christophersi*, n. sp.

Palpi with a black tip. *Turkhudi*, Liston.

εεεεε. Legs speckled and banded, abdomen densely scaled, two eye-like thoracic spots. *Kochii*, Dönitz.

ii. Costa uniformly colored.

Femora with a white band. *Lindesayii*, Giles.

Anopheles pulcherrimus. n. sp.

Thorax ashy-brown with frosty grey and very pale ochraceous scales, unadorned, except for two narrow dark lines on the posterior half. Abdomen densely covered with frosty and pale ochraceous scales, darker basal bands and distinct lateral apical tufts of black scales; venter and sides mostly white scaled. Wings with the fringe mostly pale, with seven more or less distinct dark patches; costal border with four large black spots, and a few small ones on the yellow-scaled veins. Legs ashy-grey, the fore and mid tarsi and tibiæ with apical white bands; in the hind legs, all the tarsi white, except the base of the first, which is black; a large white spot, nearly a band, near the apex of the femora. Ungues equal and simple.

♀ Head densely clothed with broad upright forked scales, creamy white in front, rich ochraceous behind; with a dense tuft of white hairs projecting forwards; antennæ dark brown, with tufts of white scales on the joints, verticillate hairs white; palpi densely scaly, covered with brown scales and four prominent white rings, the broadest being the apical one.

Thorax brown to ashy-brown, covered with broad, flat, spindle-shaped grey scales, giving it a frosty appearance. Some of these scales have a slight ochraceous tinge in some lights, three distinct tufts of long and some short white scales projecting forwards over the head; thoracic hairs pale golden; scutellum brown, with similar scales to the mesonotum, and pale golden border-bristles may be seen when held in one direction, black when held in another; metanotum brown; pleuræ densely white scaled. (When held in certain lights two dark lines show on the posterior part of the mesonotum, due to two dark lines on the denuded surface.) Abdomen black, densely clothed with flat scales, the base of each segment nude and thus black, then follows a row of white scales, the remainder rich ochraceous; at the sides of the apical end of each segment is a tuft of rather long flat black scales; border-bristles pale; venter black, with flat white scales. Legs with pale bands; fore legs with the femora and tibiæ grey beneath, with a few brown scales scattered above, metatarsi and first two tarsi with broad apical white bands, last two tarsi and bases of the others dark-brown, ungues equal and simple; mid legs much the same, but the femora dark towards the apex, with a large white spot near the apex, which is black; apex of tibiæ, metatarsi and first two tarsals white, last two deep brown, ungues equal and simple. In the hind legs the femora and tibiæ are much as in the mid, the apex of the metatarsus is white, and the whole of the tarsi except a narrow black band at the base of the first joint; ungues small, equal and simple.

Wings (Plate 5, fig. 2) with the veins mostly clothed with pale creamy scales, with four large black costal spots and two small basal ones, the apical, second and fourth black costal spots extend evenly on to the first long vein, the third has a large median and a small dark spot at each end; there are also small black spots on the veins as follows:—one at the base of the first fork-cell, one at the base and another at the apex of the third long vein; two on each branch, and three on the stem of the second fork-cell; three on the upper branch and one at the apex of the lower branch of the fifth long vein, and another at its base; three on the sixth; the fringe is mostly dark with seven pale patches; halteres pale ochraceous.

Length.—4·5 mm.

Habitat.—Lahore, India.

Observations, described from three specimens sent by Captain James, I.M.S., and Drs. Christophers and Stephens.—It is a very well defined and beautiful species, closely related to *A. Kochii*, Dönitz, but quite easily separated from it by the white hind tarsi, the absence of thoracic ocelli, and by the wing ornamentation.

The ♂ is not known.

The type has been deposited in the British Museum (Nat. Hist.) collection. The name was proposed by the collectors.

Anopheles fuliginosus. (Giles.)

A. Jamesii, Liston.

'Handbook of Gnats,' p. 160 (1900), Giles; 'Mono Culicid.,' 1, p. 132 (1901), Theobald; 'Ind. Med. Gaz.,' Dec., 1901, p. 441 (= *Jamesii*), Liston.

Thorax slaty black, with scattered flat spindle-shaped scales; legs dark brownish-black, a pale band near the apex of the femora, a white apical band to the metatarsi and first two fore tarsi; the last three and apex of the first hind tarsi white; the legs never spotted.

The costa of the wing is densely black scaled, with four white more or less prominent spots, and often two smaller ones, the first long vein with either five or six white spots; veins mostly dark scaled, and the fringe has a pale spot where each vein joins the border.

Length.—3·5 to 4·2 mm.

Localities.—Madras; Quilon; Punjaub; Calcutta; Behar; Bengal; Dacca; Mukerian; Hosiarpur; Sambalpur (C.P.); Ellichpur.

Observations.—Very closely related to *A. argyrotarsis*, Desv., which Lieutenant-Colonel Giles informs me also occurs in India. A light variety, described as var. *pallida* ('Mono. Culic.,' 1, 134), occurs in Madras. Captain Liston has described this insect as a new species, *A. Jamesii*; had this insect been new, the name could not stand, as I had previously employed it for the following species.

Anopheles Jamesii. (Theobald.)

'Mono. Culicid.,' 1, 134 (1901).

Thorax brown, with ashy-grey and creamy-curved scales. Abdomen dark brown, with golden hairs and golden-brown scales on the last few segments. Palpi black, with snow-white rings, and white apical joint. Legs brown; fore femora and tibiæ more or less spotted; fore metatarsus apically banded and *also with an indistinct median band*, first and second tarsi apically banded, and in the mid legs the metatarsus and first two tarsi apically banded; hind legs with femora and tibiæ with an apical white spot, last three tarsi white, and also the apex of the first. Costa with four large and two small dark spots.

Length.—3 to 3·5 mm.

Habitat.—Quilon, Travancore; Ceylon; Deccan.

Observations.—A small species, easily told from the other Indian species of this group by the faint mid banding of the fore metatarsi and the more or less speckled femora and tibiæ. Closely related to *A. fuliginosus*, but may be easily told from it by the above characters.

It is much smaller than the former species. I have only seen it from the south of India and Deccan.

The male at present is unknown.

Anopheles Theobaldi. (Giles.)

'Ento. Mo. Mag.,' p. 198 (1901).

Thorax sooty-black, with broad lines of white scales, two median and two lateral. Abdomen sooty, nude, with brownish hairs. Palpi black, with white apical joint and three small white rings. Legs brindled with white scales and a large sub-apical white patch on the femora; tibiæ and first tarsal joints white ringed, especially on the mid legs, last *two* hind tarsi all white. Wings jet black, with the costa interrupted by five white spots and an apical spot; fringe with pale patches where the veins join the borders; veins mainly dark scaled, but with pale areas.

Length.—3·5 to 4 mm.

Habitat.—Ellichpur, Behars; Shahjahanpur, N.W.P.

Observations.—This species can at once be told by the last *two* tarsi of the hind legs only being white.

The female only known.

Anopheles maculatus. (Theobald.)

'Mono. Culicid.,' 1, p. 171 (1901).

Thorax slaty-grey, with darker longitudinal lines and snowy-white scales; abdomen black, with yellowish hairs, very dense apically, giving the apex a dense yellow tinge. Palpi black scaled, apical joint white, also base and apex of the penultimate and apex of the others. Legs with femora, tibiæ and metatarsi banded with pale yellow; fore and mid tarsi with narrow yellow bands, hind tarsi with broad white ones, last joint pure white. Wings with four large and two small black costal spots; veins mostly pale scaled with small black spots; fringe with pale spots where the veins join the border. Male palpi brown, apical joint dilated, white on one side and a small white spot on the other side near the base; apex of penultimate joint white, and another pale ring towards the base of the palp.

Length.—3·5 to 4 mm.

Habitat.—Lahore; Punjaub (Christophers); Hong Kong (Rees).

Observations.—Described from specimens from Hong Kong. Dr. Christophers also sends specimens. Easily distinguished by the last hind tarsal only being white. Captain James, I.M.S., sent me notes on the larvæ of this species from Hong Kong, the larvæ being found in the shallow pools of marshy ground on the granite soil near Hong Kong.

Anopheles Sinensis. (Wiedemann.)

'Aussereurop. Zweiflüg. Insek.,' p. 547 (1818); 'Mono. Culicid.,' 1, p. 137 (1901), Theobald.

Thorax slaty-grey, with purplish longitudinal stripes and narrow pale golden scales and minute dark specks. Abdomen brownish-black and testaceous, with long golden hairs and traces of paler apical borders. Legs brown, paler below; tibiæ and tarsi with either apical or apical and basal pale bands, except the last two of the fore and mid legs. Palpi densely scaled with dark brown scales, apex white, and with other white bands. Costa dark brown, with two large yellow spots.

Length.—5 mm.

Habitat.—Calcutta; Madras; Formosa; China.

Observations.—This is the type of a group of closely-related mosquitoes which differ mainly in the position of the cross-veins and fork cells. These I have separated as sub-species. The following occur in India:—

Sub-species *annularis.* (Van der Wulp.)

= *A. vanus*, Walker.

'Notes Leyden Museum,' 6, p. 249, V. d. Wulp; 'Proc. Linn. Soc., Lond.,' 4, p. 91, Walker (1860); 'Mono. Culicid.,' 1, p. 142, Theobald (1901).

This sub-species is like *A. sinensis*, but the cross-veins are further apart, and the costal spots smaller, and the palpi and proboscis rather more scaly. There is no pale patch in the wing fringe where the lower branch of the fifth vein joins the border, and the majority of specimens are much smaller than the type. There is a considerable amount of variation in regard to the leg banding and the banding in the palpi.

Length.—Female, 4 to 5 mm.; male, 3·8 to 4·5 mm.

Habitat.—Madras; Sambalpur, Central Provinces; Straits Settlements.

Sub-species *Indiensis.* (Theobald.)

Fork cells much longer than in the type; the base of the first submarginal being close to the first costal spot, close to the junction of sub-costal and costal. Fringe pale at the lower branch of the fifth long vein, whilst the cross-veins resemble most nearly those of *A. annularis* (type).

Habitat.—Madras.

Sub-species *nigerrimus.* (Giles.)

'Hnd. Bk. Gnats,' p. 161 (1900), Giles; 'Mono. Culicid.,' 1, p. 145 (1901), Theobald.

Near to *annularis*, but there is a pale patch at the end of the lower branch of the fifth long vein, and the apical fringe is black.

Habitat.—Calcutta; Naini Tal; Lahore; Travancore; Dacca.

Note.—There is a slight difference in the wing scales to the other sub-species and the type, the scales being rather shorter and broader.

Anopheles barbirostris. (Van der Wulp.)

'Leydon Museum Notes,' 6, p. 48, Van der Wulp; 'Mono. Culicid.,' 1, p. 146 (1901), Theobald.

Thorax deep grey with slaty reflection, dark longitudinal lines and minute black specks, with long scattered golden hair-like scales. Palpi densely scaled, entirely black, palpi and scaled proboscis forming a very prominent black projecting mass. Abdomen nearly black. Legs dark brown, usually unbanded, but with sometimes narrow apical and basal banding. Costa black, with two small yellow spots; apical fringe black, except between the second and third veins. Scales much more robust than in *A. sinensis* and its sub-species.

Length.—5 mm.

Habitat.—Calcutta; Selangor; Old Calabar (West Africa).

Observations.—This Malay and East Indian species, which has also recently been found in India, can at once be told from the others of this group by the entirely black palpi and the much broader wing scales. Dr. Christophers sent me a note (undoubtedly concerning this species) from Gopal Chunde Chatterpee, stating that in living specimens the halteres are to be seen rythmically moving backwards and forwards, and thus differing from sub-species *nigerrimus*, in which the halteres are not so fully developed, and do not move about.

Anopheles gigas. (Giles.)

'Ento. Mo. Mag.,' p. 196, vol. 37, 1901, Giles; 'Mono. Culicid.,' 2, p. 308, 1901, Theobald.

Thorax fawn coloured in the middle, dark brown on each side; abdomen dark brown; palpi long and thin, deep brown; legs dark brown, with basal pale banding, especially to the hind legs, bases of the legs pale, almost white.

Wings with two large black spots on the costa and black patches on the wing-field; fringe pale where the veins join the border of the wings except at the ends of the fifth vein, which have a pale patch *between* them.

Length.—6 to 7 mm.

Habitat.—Conoor, Nehilgerri Hills, India.

Observations.—The largest and handsomest Indian anopheles I have seen. The two pronounced black costal spots should at once identify it. Taken at an elevation of 6,000 feet.

Anopheles metaboles. n. sp.

Thorax brown, with frosty-grey scales in the middle, the brown forming a broad line on each side. Abdomen deep brown with golden hairs and small scales. Legs deep brown speckled with white, joints of the fore and hind tarsi with apical white spots. Wings with the costa with four prominent black spots and two smaller basal ones, and a few small black spots on the veins; fringe dark, with pale areas.

♀. Head dark brown with frosty upright forked scales in front, dark brown ones behind and at the sides; antennæ dark brown; palpi deep brown with three white bands, the two apical ones the widest, the whole of the last joint is white; proboscis black. Thorax deep brown with narrow curved, flat, pale creamy scales, giving the thorax a frosty appearance in the middle, and a median tuft of white hair-like scales projecting over the top of the head; the sides of the mesothorax dark; scutellum paler brown, with narrow curved pale scales and dark brown border-bristles; pleuræ chestnut-brown, with patches of creamy scales.

Abdomen deep brown, with dense dull golden hairs, and scattered small narrow curved pale scales.

Legs dark brown, speckled with pale creamy spots; apices of the fore tibiæ, metatarsi, and first two tarsi yellow, last two all dark brown; in the mid legs the apical spots are scarcely apparent; in the hind more distinct, but the last joint is all dark brown; ungues small, equal, and simple.

Wings (Plate 5, fig. 1) with four large black costal spots, and two smaller ones near the base; the two apical costal spots are continuous

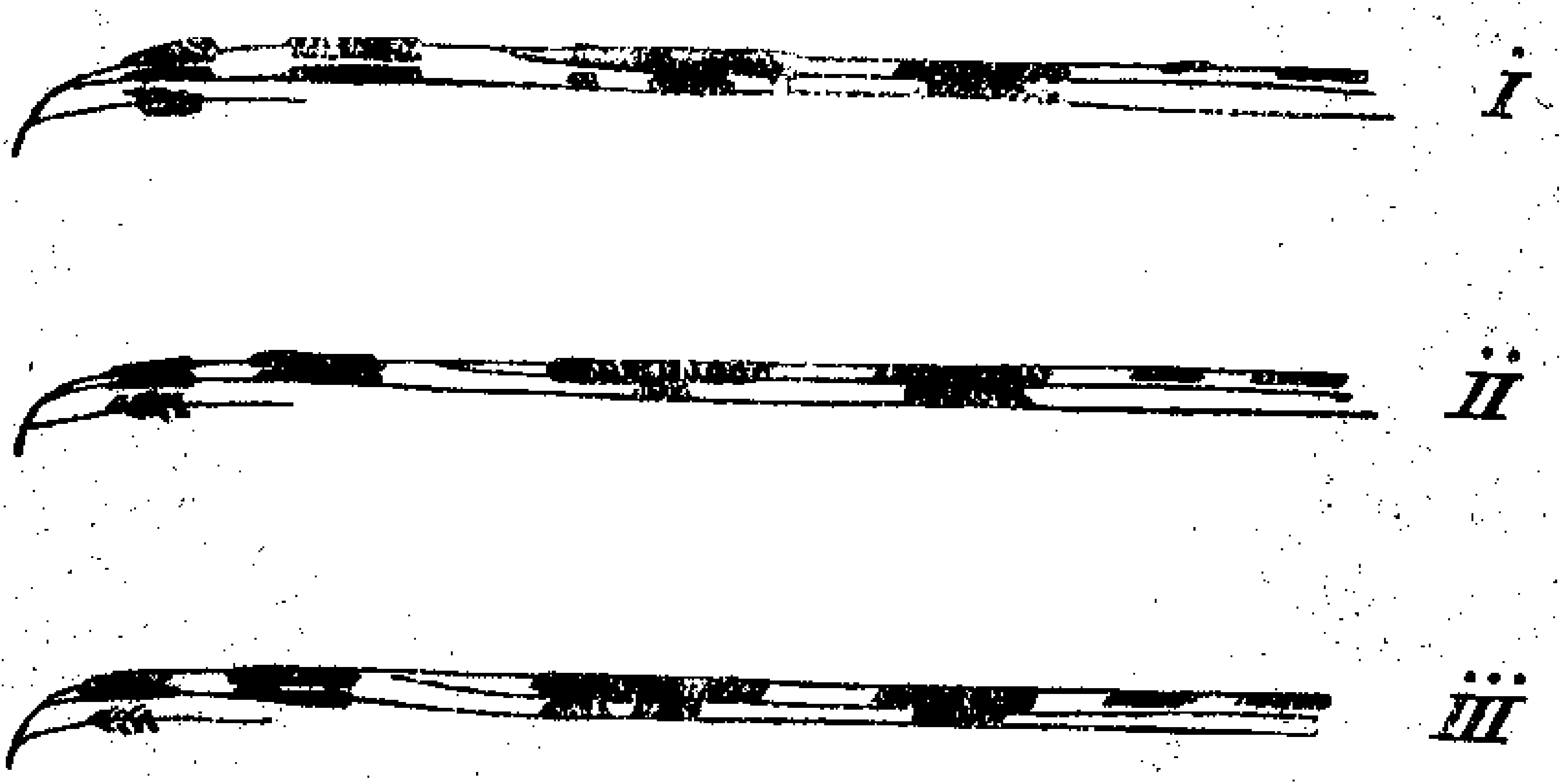

FIG. 1.—Three variations in the wing of *A. metaboles* ♀.

on to the first long vein; the third, which is the largest, has three typical spots beneath it on the first long vein (fig. 1, i); the fourth has one beneath it not quite so long; there are also black spots on the veins as follows: one on the upper branch of the first fork-cell, just below the apical costal spot, another towards the base of the fork-cell, a small one near its apex, and two small ones on the stem; two small spots at the base, and one at the apex of the third vein; two on the upper and one on the lower branch of the second fork-cell, and two long ones on its stem; two on the upper, one on the lower branch of the fifth long vein, and one at its base; three small ones on the sixth vein; fringe dusky, partly yellow at the apex, and with a yellow spot at the terminations of the veins; fork-cells short, base of the first submarginal slightly the nearer to the base of the wing, its stem nearly as long as the cell; stem of the second posterior longer than the cell; supernumerary cross-vein nearly its own length in front of the mid cross-vein, the posterior cross-vein longer than the mid, nearly twice its own length distant from it, stoping towards the base of the wing.

Length.—3·5 to 4·5 mm.

Habitat.—Lahore, India.

Observations.—Described from five ♀'s sent by Captain James and Drs. Christophers and Stephens. It comes near *A. maculata*, Theo. (p. 171, vol. 1, 'Mono. Culicidæ'), but can at once be told by the last hind tarsi not being white as in that speckled-legged anopheles; from the speckled-legged *A. Theobaldi*, Giles ('Ento. Mo. Mag.,' p. 198, 1901), and *A. Jamesii*, Theo. ('Mono. Culicidæ,' p. 134, vol. 1), also by the hind tarsi not being white. The third spot on the border of the wing is subject to some variation, as shown in fig. 1. One specimen has only two spots on the sixth long vein, not three.

Anopheles Rossii. (Giles.)

'Journ. Trop. Med.,' Oct. 1899, Giles; 'Hnd. Bk. Gnats,' p. 149, Giles; 'Mono. Culicid.,' 1, p. 154, Theobald.

Thorax pale yellowish-brown, with scattered greyish reflections, and with a darker median line and scattered pale scales and hairs. Palpi of ♀ dark-scaled, white apically, and with two other pale bands; of ♂, swollen at the end, yellow, with a broad black band at the base, one in the middle, and a small broken one at the apex of the same joint, and a narrow black ring at the base of the last two apical joints. Abdomen dusky, with a dense covering of ochraceous hairs. Legs yellow, with brown scales and yellowish bands, both apical and basal to the tarsi. Wings with four black costal spots, the largest usually flatly T-shaped, but variable; fringe with yellow spots where the veins join the border of the wings, except at the sixth vein.

Length of ♀ 4 to 6 mm.; of ♂ 4·5 to 5·5 mm.

Habitat.—Calcutta; Lucknow; Madras; Quilon; Behar, Bengal; Dacca; Sambalpur; Etawah, N.W.P.; Singapore; Perak, and other Malay States.

Observations.—This species seems to be very variable in regard to the wing markings. The typical costal T-shaped spot will not distinguish the species as I previously supposed, as this spot is variable. Several specimens have an accessory spot at the end of the T-shaped one;

others Dr. Christophers sends me have the T-spot badly developed; others have the first and second large spots united on the costa.

In any batch of *A. Rossii* caught at Calcutta, it seems from the joint letter of Captain James, I.M.S., and Drs. Stephens and Christophers, several variations from the type may be found.

It appears this common Asiatic species does not take part in the distribution of malaria.

Anopheles Indicus. (Theobald.)
= *A. culicifacies.* Giles. (♀.)
'Mono. Culicid.,' 1, p. 183, 1901.

Thorax pale ochraceous-brown, with pale golden hair-like curved scales and black bristles; palpi dark brown, with yellowish-white apex and two other pale rings. Abdomen dark shiny-brown, densely clothed with golden-brown hairs; venter pale ochraceous. Legs dark brown, almost black, a small yellow spot at the apex of the tibiæ and femora. Wings with costal border marked with four prominent black spots and a small basal one; wing-fringe dusky, with *three yellow patches*, namely, at the ends of the lower branch of the fourth and the two branches of the fifth.

Length.—3 to 3·5 mm. *Habitat.*—Madras.

Observations.—I have seen only a single specimen of this insect. It is very similar to Grassi's *A. superpictus*, but much smaller, and has no tarsal banding.*

Anopheles Listoni. (Giles.)
= *A. culicifacies.* ♀. (Giles.)*
'Ento. Mo. Mag.,' p. 197, 1901.

Thorax dark brown at the sides, paler in the middle; abdomen deep brown, with scattered pale hairs. Legs dark brown, unbanded. Wings with the costa black, including the actual base, with four small distinct yellow spots, the largest light area being that quite at the base; fringe dark, except at the apex, and indistinct paler patches opposite one or two of the longitudinal junctions. Palpi of ♀ black, with *two narrow rings and a minute white tip*; in the ♂, black with two whitish bands. (Fresh specimens show three fringe spots.)

Length.—3·5 to 4 mm.

Habitat.—Ellichpur, Behars; Etawah, N.W.P.

Observations.—This and my *A. Christophersi* are very closely related, but can easily be separated by the difference in the banding of the palpi.

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* Having recently examined a fresh series of *culicifacies*, I am convinced my *A. Indicus* is the same. This name must therefore sink as a synonym, as Col. Giles described *Listoni* and *culicifacies* a month before my *Indicus*. Giles's ♀ *culicifacies* is the same as *Listoni*, so that both names sink under *culicifacies*, as the latter was described first.

Anopheles Christophersi. n. sp.

Thorax brown with narrow curved, long, pale golden scales, slightly darker at the sides. Abdomen dark brown with golden hairs. Legs dark brown, unbanded, and with no knee or other spots. Palpi brown to black, with two broad apical white bands and a narrow one towards the base. Wings with the costa black, with four small yellow spots, the basal one rather indistinct, veins with rather long scales, the black ones being most prominent; fringe black, with four pale spots.

♀. Head dark brown, with broad white upright forked scales in front, black ones behind, and a dense tuft of white hairs projecting forwards; palpi dark brown, almost black, densely scaled, with two broad apical bands and a narrow one on the apex of the basal third of the palpi; antennæ bright brown; proboscis deep brown with pale apex

Thorax brown, with long, narrow, curved, hair-like, golden scales and brown bristles; scutellum cinereous-brown with a double row of border-bristles, the outer ones being large, the inner small; metanotum deep brown to black.

Abdomen almost black, with golden hairs. Legs completely dark brown with bronzy reflections in the sun; ungues equal and simple.

Wings (Plate 5, fig. 3) with the costal border black, with four small yellow spots, and the apex yellow, the basal spot very small; the yellow spots spread uniformly on to the first long vein except the third which passes well under the black costal spot; scales of the veins mostly black; a yellow patch at the base of the fork-cells and *on most of the third long vein*, a long patch at the base and another towards the middle of the fourth vein; one large and one small patch on the upper and one large one on the lower branch of the fifth vein, the stem mostly pale; most of the sixth dark, but there is a broad yellow line towards the base; fringe black, with yellow spots at the end of the veins, except where the sixth joins the costal border; first submarginal cell considerably longer and narrower than the second posterior cell, its base much the nearer to the base of the wing; its stem about half the length of the cell; stem of the second posterior about one and a half times the length of the cell; supernumerary cross-vein about half its own length in front of the mid cross-vein; the mid more than its own length in front of the posterior. Halteres with pale testaceous stem and black knob.

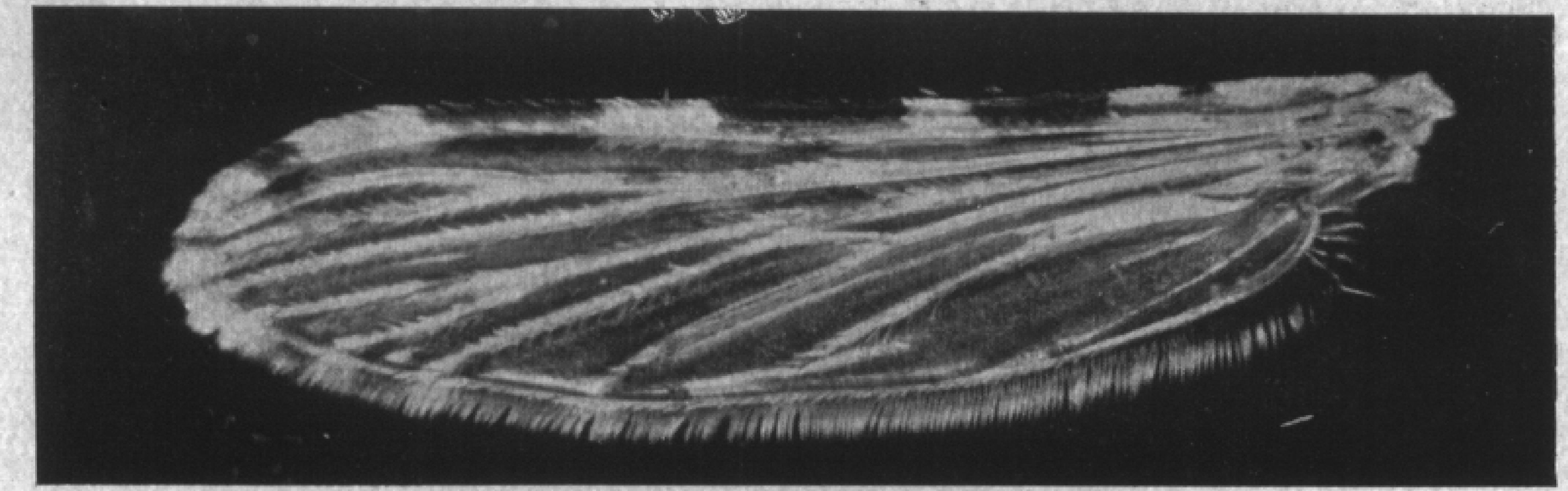
Length.—2·5 mm.

Habitat.—Duars (Christophers).

Observations.—Described from two ♀'s sent to the Royal Society.

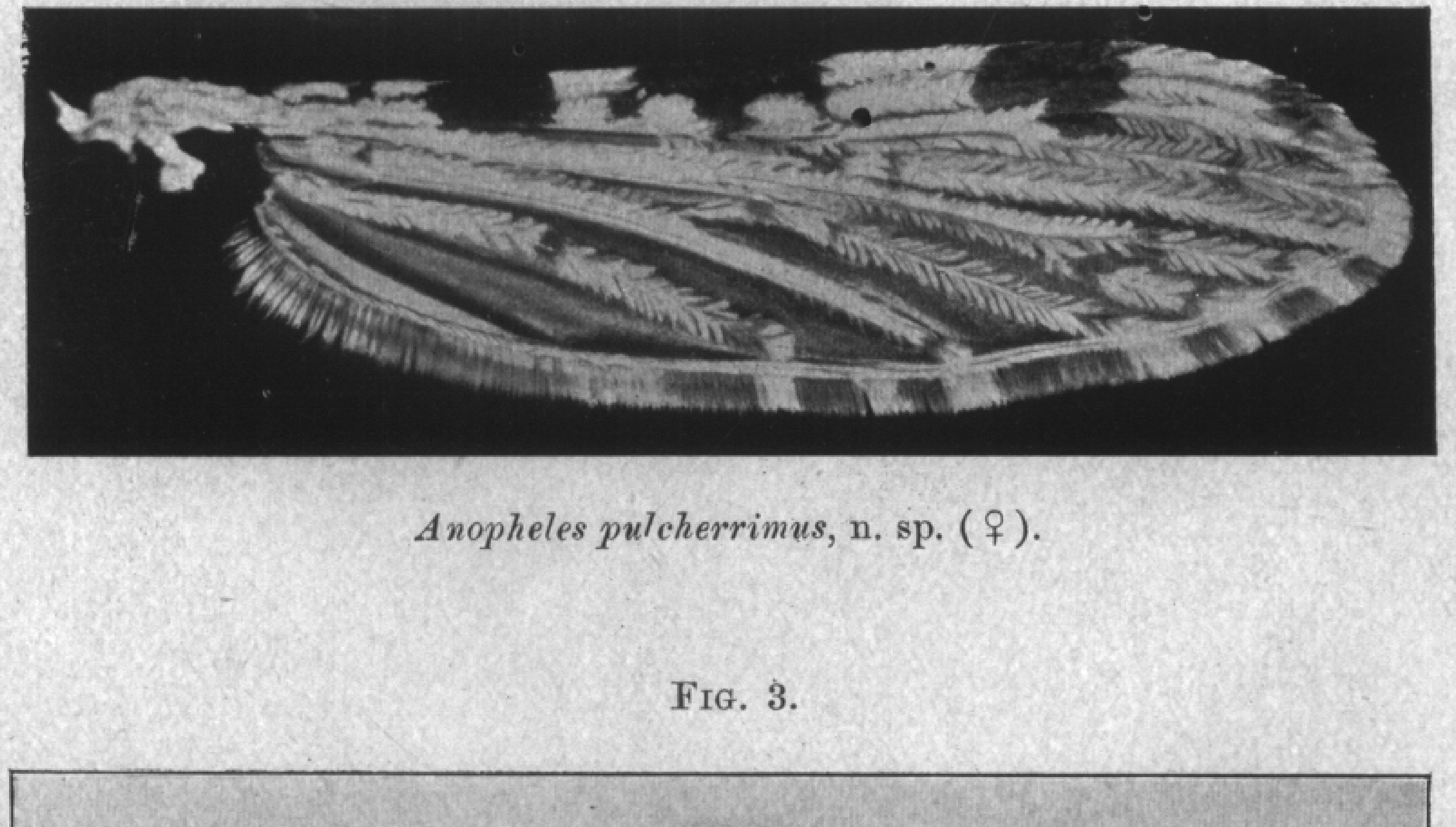
The species is very closely related to my *A. Indica*, but has more than three pale fringe spots, and the cross-veins are not the same, being more like *A. superpictus*, Grassi. The long black basal part of the costa is also very characteristic, as also is the pale third long vein.

FIG. 1.



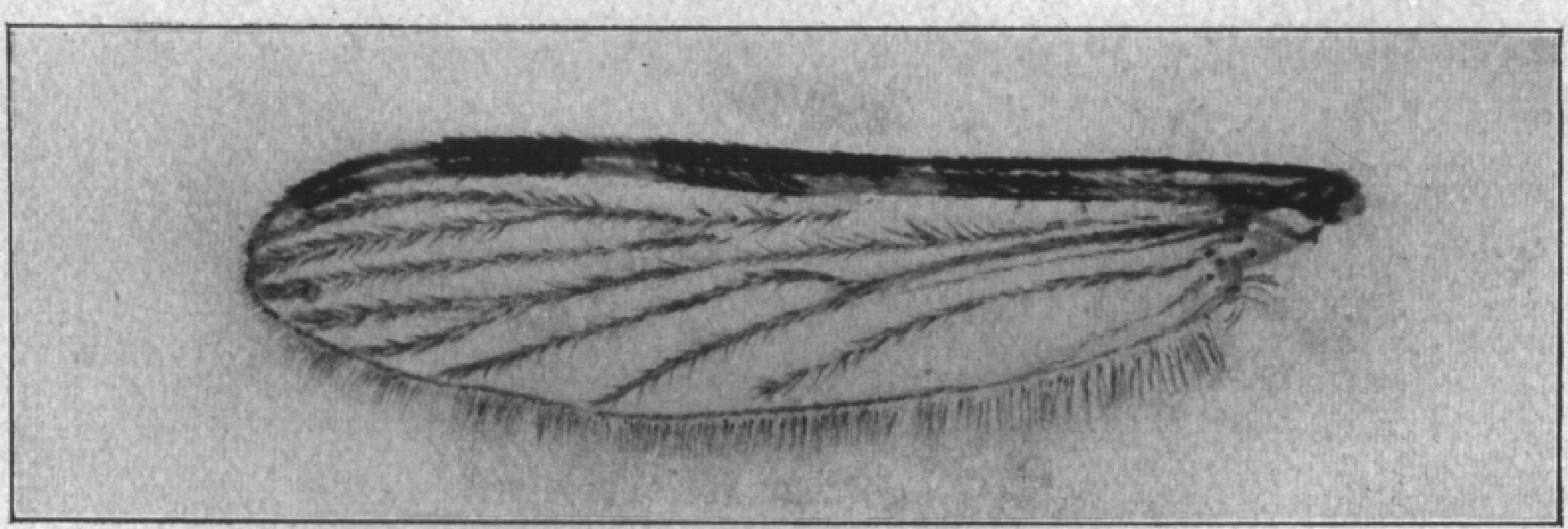
Anopheles metaboles, n. sp. (♀).

FIG. 2.



Anopheles pulcherrimus, n. sp. (♀).

FIG. 3.



Anopheles Christophersi, n. sp. (♀).

[From negatives taken by
Mr. W. H. Hammond.

WINGS OF THREE NEW INDIAN ANOPHELES (♀'s).

The only other unbanded legged Indian species related to it are *A. Listoni*, Giles, *A. culicifacies*, Giles, and *A. Turkhudi*, Liston; the first has the largest right costal area at the base of the wing and the forked scales of the head mostly dark in the ♀, and the ♀ palpi with two narrow rings and a minute white tip. *A. culicifacies* has only three pale fringe spots.

A. Turkhudi differs in having the apex of the palpi black in the ♀.

A. Christophersi is abundant in the malarious district of Duars, and is a prominent malaria bearer.

Anopheles Turkhudi, Liston.

A. culicifacies ♂. Giles.

'Indian Med. Gazette,' December 1901, p. 441.

"Thorax covered with white scales on a dark background, scales so arranged as to show a median and two rather less distinct, lateral, darker, longitudinal markings. Lateral aspects of the thorax covered with brown scales, often tipped with white. Abdomen dark olive-green colour, covered with many light yellow hairs. Legs dark scaled, except for a few yellowish-white scales at the distal extremities of the femora and tibiæ. Proboscis dark, yellow at tip. Palpi with black scaled tips, and with three white scaled bands on each; wing with six white scaled portions to the costa, one at the apex of the wing; the first long vein has five white areas corresponding with the five outer white ones on the costa, in addition a small white interruption at the position of the marginal transverse vein; fringe with pale interruptions, except at the sixth vein.

"*Habitat.*—Ellichpur. *Time of Capture.*—March and April."

Note.—I have not seen this species. It is described by Captain Liston, I.M.S., and seems clearly distinct. Unfortunately no measurements are given in his paper. The figure given shows the tarsi banded with narrow pale bands, thus differing from the description in the text. The black-tipped palpi should easily enable the observer to identify this Anopheles.—(F. V. T.)*

Anopheles culicifacies. (Giles.) ♀.

A. Listoni. Giles.

A. Indica. Theobald.

'Ento. Mo. Mag.' p. 197 (1901), Giles; 'Mono. Culicid.,' ii, p. 309 (1901), Theobald.

Thorax brown, darker at the sides; abdomen brown, with deep brown apical bands, slightly darker at the sides. Legs dark brown, unbanded. Wings with four almost equal sized pale spots on the costal border and one smaller basal one; third long vein dark. Palpi of ♀ thin, brown with two narrow pale bands and a pale apex; of ♂ brown, the last two joints swollen, the penultimate and antepenultimate with apical pale bands, the apex of antepenultimate and the penultimate with golden-brown hair-tufts.

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* Since this went to press, Capt. Liston has presented the types to the British Museum.

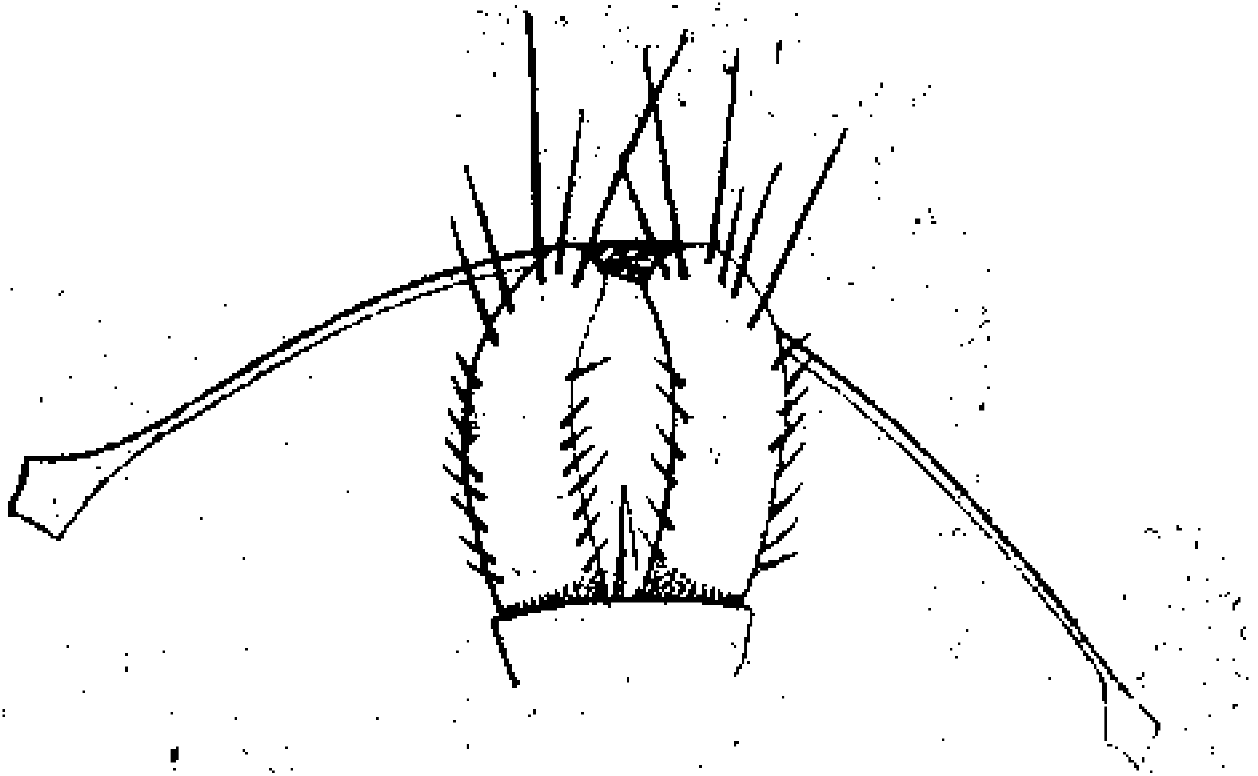

FIG. 2.—Male genitalia of *A. culicifacies*. (× 50.)*

Length of ♀ 3·8 mm.; of ♂ 3·5 to 4 mm.

Habitat.—Hoshangabad (C.P.), and Behars; Lahore, Punjaub.

Observations.—A very distinct species. The abnormal habit of assuming the position of *Culex* when resting should also identify it when alive. The abdomen when fresh seems to have conspicuous banding. The wing-fringe in the ♀ type is unspotted, but this is due to fading; fresh specimens have three spots.

The male genitalia (fig. 2) are very peculiar.*

Anopheles Kochii. (Donitz.)

'Insecten Börse,' 5 Jr., 18, 31 January, 1901, p. 36, Dönitz; 'Mono. Culicid.,' 1, p. 174 (1901), Theobald.

Thorax fawn coloured, with two large eye-like black spots; the front with longish white, the rest with creamy curved scales. Abdomen ashy-brown with numerous scales and dull golden hairs and lateral dark tufts of scales as in *A. pulcherrimus*, Theobald. Legs banded and marked with dark brown and yellow, some of the tarsi basally brown banded. Costa creamy-yellow with four black spots and numerous small ones over the wing field.

Length.—3 mm.

Habitat.—Malay Peninsula, East Indies (Sumatra and Java); Calcutta.

Observations.—Very like *A. pulcherrimus*, and closely related to it, being densely scaly, and with similar lateral apical tufts to the abdominal segments, but easily separated by the two thoracic ocelli and the absence of white hind tarsi.

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* The ♀ type of *culicifacies* is the same as Giles's ♀ *Listoni*; as *culicifacies* was described first, that name stands. The ♂ type of *culicifacies* is a ♂ *A. Turkhudi*. Liston.

Anopheles Lindesayii. (Giles.)

'Hnd. Bk. of Gnats,' p. 166 (1900), Giles; 'Mono. Culicid.,' 1, p. 203 (1901), Theobald.

Thorax ashy-grey in the middle, a dark brown stripe on each side, with three dusky median lines and golden hair-like scales. Abdomen black, with numerous pale and dark hairs. Costa black, with one creamy patch near the apex; veins mostly black scaled; legs black; posterior femora with a broad white band in the middle.

Length.—4·5 mm.

Habitat.—Bakloh, Punjaub; Naini Tal; Kurseong (Darjeeling) Mussoorie.

Observations.—A very distinct species, at once told by the broad white band on the posterior femora.

Genus *Toxorhynchites.* (Theobald.)

'Mono. Culicidæ.,' 1, p. 244 (1901).

This genus resembles *Megarhinus*, but the ♀ palpi are short and thick, and three-jointed. Several species described as *Megarhinus* will have to come in this genus, including the Indian species.

Toxorhynchites immisericors. (Walker.)
Megarhinus immisericors. (Walker.)
Culex regius. (Thwaites.)
Megarhinus Gilesii. (Theobald, 1901.)

'Proc. Linn. Soc. Lond.,' iv, p. 91 (1860), and vii, p. 202, Walker; 'Mono. Culicid.,' 1, p. 225 (1901), Theobald.

This large mosquito, called the elephant mosquito, can at once be told from other Indian *Culicidæ* by the caudal tuft. Walker described it as a Megarhinus. Not having seen the ♀ (as I imagined) when my recent monograph of 'Culicidæ' went to press, I included the ♂ in that genus. The ♀'s have short palpi, and thus the species comes in my genus *Toxorhynchites.* There is considerable variation in the leg banding. The ♀ specimens I described as *M. Gilesii* I now find are only Walker's species *immisericors.*

Habitat.—Travancore; Trincomalie, Hot Wells; Ceylon; Celebes; Mysol; North Ceram; Weigiou; Sikkim; Burma.

Genus *Mucidus.* (Theobald.)

'Mono. Culicid.,' 1, p. 268 (1901).

This genus can at once be identified by the curious twisted scales, giving the insects a mouldy appearance.

Mucidus scataphagoides. (Theobald.)

'Mono. Culicid.,' 1, p. 277 (1901), Theobald.

Thorax densely covered with loose scales, giving it a grey, mouldy hue, with a yellowish-brown patch on each side; having the appearance of the head of an insect. Abdomen yellowish-brown, with a white median tuft of scales on the first four segments, remainder mostly white scaled. Wings with fringe with alternate pale and dusky patches; scales on the veins dense, forming dusky and ochraceous patches. Legs ochraceous banded with ochraceous-yellow and brown parti-coloured scales and white scales.

Length.—6·5 to 7 mm.

Habitat.—Moradabad (N.W.P.) and Burma.

Observations.—Easily told from all other Indian mosquitoes by its large size and curious twisted scales.

Genus *Stegomyia.* (Theobald.)

'Mono. Culicid.,' 1, p. 283 (1901).

Thick set culices with flat scales and upright forked-scales over the head only and flat scales on the scutellum.

Five species of this genus occur in India, which may be tabulated as follows :—

A. Tarsi basally banded.

α. Proboscis banded distinctly in ♂, less so in the ♀.

Wings with black scales and scattered white ones. *pipersalata.* (Giles.)

αα. Proboscis unbanded.

Thorax with two median parallel pale lines and lateral curved pale lines. *fasciata.* (Fab.)

Thorax with a single median silvery line and lateral curved lines. *scutellaris.* (Walker.)

B. Tarsi apically and basally banded.

Thorax with narrow median silvery line and lateral curved lines and two short yellow ones in front. *pseudotæniata.* (Giles.)

Thorax sooty, with a round anterior median and four lateral snowy spots at corners of the mesonotum. *gubernatoris.* (Giles.)

Stegomyia pipersalata. (Giles.)

'Hand Bk. Mosq.,' 2nd ed. (1901), Giles.

'Mono. Culicid.,' ii, p. 316 (1901), Theobald.

Clearly told by the white and black wing scales from other Indian species. I have only seen the types presented to the Museum. (Col. Giles.)

Habitat.—Jhansi and Gonda, N.W.P.

Stegomyia fasciata. (Fab.)

'Syst. Antl.,' 36, 13 (1805), Fab.; 'Mono. Culicid.,' 1, p. 289 (1901).

This common household species has been recorded from Quilon, Calcutta, Madras.

It does not seem to be so abundant in India as in other parts of the world. This is the species which is connected with yellow fever. It is known under at least fifteen different names, the commonest being *Culex tæniatus*, Wiedemann.

Stegomyia scutellaris. (Walker.)

C. albopictus. (Skuse.)
C. variegatus. (Doleschall.)

'Proc. Linn. Soc. Lond.,' iii, p. 77 (1859), Walker; 'Mono. Culicid.,' 1, p. 289, Theobald.

An abundant Asiatic species, occurring in India at Madras, Naini Tal, Sambalpur (C.P.); Calcutta, &c. It is the same as Skuse's *Culex albopictus*, recorded from Calcutta, where it is a great nuisance.

Stegomyia pseudotæniata. (Giles.)

'The Entomologist,' p. 192 (1901), Giles; 'Mono. Culicid.,' 1, p. 312 (1901), Theobald.

I have only seen a single specimen of this marked *Stegomyia*, and have no further notes to add.

It occurred at Naini Tal (7,000 feet), Bakloh, Punjaub (6,000–8,000 feet).

Stegomyia gubernatoris. (Giles.)

'The Entomologist,' p. 194, July (1901), Giles; 'Mono. Culicid.,' 1, p. 314 (1901), Theobald.

A single specimen only has so far been taken by Colonel Giles in Government House, Allahabad. The marked thoracic ornamentation mentioned in the table makes its identification an easy matter. Evidently a rare species.

Genus *Armigeres.* (Theobald.)

'Mono. Culicid.,' 1, p. 322 (1901).

Separated from *Stegomyia* by the long, thin, hairless ♂ palpi and peculiar larva.

Armigeres obturbans. (Walker.)
Culex obturbans. (Walker.)
Culex ventralis. (Walker.)

'Proc. Linn. Soc. Lond.,' iv, p. 91 (1860), et v, p. 144, Walker; 'Mono. Culicid.,' 1, p. 323 (1901), Theobald.

Thorax black, covered with bronzy scales in the middle of the mesothorax and with creamy-white ones all round, forming a broad, pale band. Abdomen black, with large white triangular lateral spots, last segment white. Legs black, bases and venter of the femora pale, almost white.

Length.—6·5 to 7·5 mm.

Habitat.—Madras; Naini Tal; Travancore; Morzufferpur, Behar, Bengal; Malay Peninsula; Hong Kong; Formosa; Foo Chow; East Indies.

Observations.—This is one of the most abundant Asiatic species.

Lieut.-Colonel Giles has sent me specimens from India under different specific names, but only one seems at all distinct. The species is certainly subject to considerable variation in size.

If the species of this genus are to be separated I am sure they can only be done so by an examination of the male ungues and genitalia. For the present I retain them all but one in this species. The typical ♂ ungues are as follows—the fore unequal, both uniserrated, the mid smaller than the fore, not so unequal and uniserrated; the hind small, equal and simple.

Armigeres panalectros. (Giles MS.)

'Mono. Culcidæ,' 2, p. 317 (1901).

This species is much smaller than *A. ventralis*, and has the thorax elaborately adorned; mouse coloured adorned with lighter lyre-shaped marks, and all the ungues of the male are toothed.

Habitat.—India.

Genus *Culex*. Linnæus.

'Linn. Syst. Nat.' (1735), Linnæus; 'Mono. Culicid.,' 1, p. 326 (1901), Theobald.

The type may be taken as *C. fatigans*, Wied., or *C. pipiens*, L., head scales and thoracic scales being mostly narrow curved ones.

Sixteen species of Culex are so far known in India; the following table will help identify them:—

A. Wings spotted.
  α. Wings spotted along the costa. Proboscis banded.
    mimeticus. (Noe.)

αα. Wings faintly spotted on wing field. Thorax
with lines of white scales; legs spotted; wing sp
spathipalpis. (

AA. Wings unspotted.

β. Legs banded.

γ. Proboscis banded with one pale band.

δ. Tarsi basally banded.

ε. Abdomen with lateral white spots and basal bands; ♀ fore ungues equal and simple. *microannulatus.* (Theobald.)

εε. Abdomen basally banded, but with no lateral spots.

Mid and hind legs with a broad tibio-metatarsal band. *impellens.* (Walker.)

No broad tibio-metatarsal band, last abdominal segments with apical and basal banding. *Vishnui.* (Theobald.)

γγ. Proboscis with three pale bands. Tarsi basally banded. *tritæniorhynchus.* (Giles.)

γγγ. Proboscis unbanded.

δ. Legs basally banded.

ε. Thorax not ornamented.

Abdomen with basal and some apical bands; fore and mid ungues of ♀ uniserrated. *cantans.* (Meigen.)

δδ. Legs basally and apically banded.

Thorax adorned with frosty-white scales on anterior two-thirds. *gelidus.* (Theobald.)

δδδ. Legs unbanded.

ε. Legs with a white line on femora and tibiæ. *tipuliformis.* (Theobald.)

Legs uniformly coloured.

Abdomen with lateral white spots and basal patches.

Thorax golden scaled, with lateral lines of brighter golden scales on posterior half; abdomen with curved lateral silvery spots. *pulcriventer.* (Giles.)

ζζ. Abdomen with basal pale bands.

Thorax black, with ferruginous scales, pale at the sides. *nigripes.* (Zett.)

ζζζ. Abdomen apically banded

First few segments with yellow apical bands, remainder all ochraceous. *concolor.* (Desvoidy.)

Pipiens Group.

α. Abdomen basally banded.

β. Thorax unadorned.

Abdominal bands swollen out in middle, apical segments white. *viridiventer.* (Giles.)

Abdominal bands uniform. *quasipipiens.* (Theobald.)

ββ. Thorax adorned.

Thorax with two or three dusky, longitudinal lines; basal abdominal bands curved, white or creamy.

fatigans. (Wiedemann.)

Abdominal bands swollen into a median, triangular patch.

angulatus. (Theobald.)

Culex mimeticus. (Noe.)

'Boll. d. Soc. Ent. Ital.,' 31, p. 240 (1897), Noe; 'Mono. Culicid.,' 1, p. 329 (1901), Theobald.

Thorax brown, with dark stripes and with golden curved scales. Abdomen brown, with basal white bands; venter white. Legs brown, metatarsi and tarsi with basal white bands and traces of apical ones. Proboscis banded. Wings spotted with brown and yellow along the costa, three yellow spots.

Length.—5 to 6 mm.

Habitat.—Punjaub; Perak; Italy.

Observations.—Apparently a common species in parts of Northern India and Malay Peninsula. Easily told by its wings, resembling those of an Anopheles. There seems to be considerable variation in size in the specimens I have recently seen.

Culex spathipalpis. (Rondani.)

'Dipt. Ital. Prodro.,' vol. 1 (1886), Rondani; 'Mono. Culicid.,' 1, p. 339 (1901), Theobald.

Thorax umber-brown, with a median line of white scales, a bent white lateral line, and another more indistinct on each side below. Abdomen yellow scaled, with scattered black ones which form patches, basally banded white, the bands expanding backwards in the middle of the second and third segments and produced laterally. Legs with lines of white spots, often almost forming stripes; metatarsi and some of the tarsi basally banded white. Wings with three small more or less distinct patches of scales.

Length of ♀ 7 to 8 mm.; of ♂ 7 to 8 mm.

Habitat.—India (Naini Tal); Italy; Gibraltar; Palestine.

Observations.—A very marked species occurring in Europe and India. The spotted legs and wings and its large size will at once separate it.

Culex microannulatus. (Theobald.)

'Mono. Culicid.,' 1, p. 353 (1901), Theobald.

Thorax brown, with curved golden-brown scales and three rows of dark bristles; abdomen dark brown with basal greyish-white bands.

Proboscis with a broad yellowish-white band in the middle. Legs brown, with small yellow basal rings and a small white band at the apex of the femora. Head brown, covered with creamy-brown curved scales and a pale border round the eyes and upright brown forked scales.

Fore ungues of ♂ unequal, the larger uniserrated, the smaller simple.

Length of ♀ 5 mm.; of ♂ 5 mm.

Habitat.—Quilon, Travancore; Madras; Calcutta, and North-West Provinces.

Observations.—Very like the next species, only darker, rather larger, and the head all pale instead of with two black patches as in *C. Vishnui*. The ♂ ungues also differ.

Culex Vishnui. (Theobald.)

'Mono. Culicid.,' 1, p. 355 (1901).

Thorax brown, with fawn coloured scales, two more or less distinct median lines and a thin central one formed by a row of bristles. Abdomen deep brown, basally banded with pale yellow, some of the apical segments with a narrow row of apical yellow scales as well. Legs brown, tarsi darker, narrowly basally banded with yellow; ungues of ♀ equal and simple. Head with dark lateral patches. Male fore ungues, unequal, both uniserrated.

Length of ♀ 3 to 4·5 mm.; of ♂ 3 to 4 mm.

Habitat.—Quilon; Sambalpur; Punjaub; Madras; Dacca; Ceylon.

Observations.—Resembling the former, but easily told by the paler hue and head ornamentation, as well as the ♂ ungues. Evidently a common southern form. Not so far recorded from Northern India.

Culex impellens. (Walker.)

'Proc. Linn. Soc. Lond.,' iv, p. 91, Walker; 'Mono. Culicid.,' 1, p. 362 (1901), Theobald.

Thorax dark brown, covered with pale golden curved scales. Abdomen covered with dusky-brown scales, with basal white bands. Legs brown, the mid and hind legs with a pale band involving both sides of the tibio-metatarsal joint; tarsal banding basal. Bases of fork-cells nearly level.

Length.—♀ 4·5 mm.

Habitat.—N.W. Provinces; Calcutta; Perak.

Observations.—Closely related to *C. microannulatus*, but easily told by the tibio-metatarsal banding.

Culex tritæniorhynchus. (Giles.)

'The Entomologist,' p. 192 (1901), Giles; 'Mono. Culicid.,' 1,
p. 364 (1901), Theobald.

Thorax fuscous with golden-brown tomentum, unadorned. Abdomen fuscous with narrow yellowish-white basal bands, broader in the middle than laterally. Legs minutely basally banded; proboscis with three ochraceous bands.

Length of ♂ 2·4 mm.; of ♀ 3 mm.

Habitat.—India.

Observations.—I have not been able to find this species amongst those sent me by Colonel Giles, nor have I seen any triple-banded proboscis species. Several specimens of *C. Vishnui* have appeared so through denudation however.

Culex cantans. (Meigen.)
C. stimulans. (Walker.)
C. maculatus. (Meigen.)
C. fumipennis. (Stephens.)

'Syst. Beschr.,' 1, 6, 6, Meigen (1818); 'Mono. Culicid.,' 1,
p. 401 (1901), Theobald.

Thorax dark brown, covered with narrow, reddish, and golden-brown curved scales, paler and broader just before the scutellum and at the sides of the mesonotum. Abdomen dark brown, with basal pale bands which often spread out laterally on some of the segments; the last few segments have traces of apical banding also, the apical segments often entirely pale scaled. Legs dark brown, mottled with paler scales, metatarsi and tarsi with pale broad basal bands; fore and mid ungues of ♀ thick, equal, uniserrated; hind simple.

Length of ♀ 6 to 7 mm.; of ♂ 7 mm.

Habitat.—Europe, N. America, and India.

Observations.—A very distinct, large species common in Europe. The mid cross-vein and supernumerary in one line. Colonel Giles has given an undoubted specimen of this species to the British Museum. It was taken by Dr. Price at Conoor in the Nehilgerry Hills at an elevation of 6,000 feet.

Culex gelidus. (Theobald.)

'Mono. Culicid.,' ii, p. 20 (1901), Theobald.

Thorax dusky yellowish-brown to deep brown, with the anterior two-thirds covered with frosty-white curved scales, the hind portion with almost black scales and long black bristles. Abdomen brown with basal creamy-white bands and pale lateral spots. Ungues of the ♀ equal and simple.

Length of ♀ 4·5 mm.

Habitat.—Quilon, Travancore; Dacca; Ceylon; Perak; Selangor.

Observations.—A very distinct species with a wide distribution in India. The frosty anterior two-thirds of the thorax will identify it at once.

A distinct variety, *cuneatus*, occurs in Southern India at Quilon, in which the abdominal bands have a triangular median projection.

Culex tipuliformis. (Theobald.)

'Mono. Culicid.,' ii, p. 325 (1901), Theobald.

Thorax brown, with narrow, golden-brown curved scales, paler behind; pleuræ white scaled. Abdomen dark brown, with basal white median semicircular patches on segments two to five, basal bands spreading out laterally on the apical segments; legs unbanded, paler brown, long and thin; femora and tibiæ with a distinct line of white scales running down them. Proboscis with apparently two pale bands.

Length.—5·8 mm. (♀).

Habitat.—Bakloh (N.W.P.).

Observations.—A very distinct large species, with peculiar leg ornamentation. I am not certain of the proboscis banding, having seen only a single specimen.

Culex pulcriventer. (Giles.)

'The Entomologist,' p. 194 (1901), Giles; 'Mono. Culicid.,' ii, p. 48 (1901), Theobald.

Thorax black, with a patch of golden scales in front, a line of golden scales on each side, along posterior half of mesonotum, curved downwards in front, and a row of golden scales on each side of the bare space in front of the scutellum. Abdomen black, with basal silvery white curved lateral patches; venter golden-yellow, with basal white patches, and a narrow black border to the segments. Legs black, basal parts creamy white.

Length of ♀ 5·5 to 6·5 mm.; of ♂ 5 to 5·5 mm.

Habitat.—Naini Tal, India.

Observations.—Easily identified by the peculiar thoracic ornamentation and the basally white femora.

Culex nigripes. (Zetterstedt.)
C. impiger. (Walker.)
C. implacabilis. (Walker.)

'Ins. Lapp.' (1838–40), Zetterstedt; 'Mono. Culicid.,' ii, p. 93 (1901), Theobald.

Abdomen black, with basal white bands, which spread out laterally on the last few segments. Legs black; femora pale beneath; fore and mid ungues of ♀ equal, uniserrated.

Length of ♀ and ♂ 4·5 to 6 mm.

Habitat.—N. Europe; N. America and India (Kashmir); Greenland and Arctic Circle generally.

Observations.—Some damaged specimens have been received by the British Museum (Nat. Hist.) from Dr. Neve from the Deosai Plateau, between Kashmir and Shardo, between 13,000 and 13,500 feet. They are undoubtedly this species which seems to spread out round the north polar region to about 35° latitude.

Culex concolor. (Robineau Desvoidy.)

'Mém. Soc. Hist. Nat. de Paris,' 4, 405, Rob. Desv.; 'Mono. Culicid.,' ii, p. 107 (1901), Theobald.

Thorax brown, with tawny and fawn-coloured curved scales, with patches of paler scales in the middle line in front, a central patch, two lateral ones, and other pale scales in front of the scutellum. Abdomen with brown scales, the first few segments with apical dull creamy borders; the fifth with a dark basal band, most of it and all the remaining segments densely ochraceous yellow; wings with a yellowish tinge.

Length of ♀ 6 to 8 mm.; of ♂ 7 mm.

Habitat.—Asia generally.

Observations.—A common and widely distributed Asiatic species occurring in China, all over the Malay Peninsula, India, and Ceylon. Easily told by its general ochraceous fawn-coloured hue.

Culex viridiventer. (Giles.)

'Journal Bombay Nat. Hist. Soc.,' p. 609, No. 4, vol. 13 (1901), Giles; 'Mono. Culicid.,' ii, p. 128 (1901), Theobald.

Thorax dark brown, with short, narrow curved deep golden-brown to bronzy scales, paler in front of the scutellum. Abdomen dusky black, with basal white bands on the second and third segments, not always complete; in the fourth to sixth the bands are very distinct and swell out in the middle; apical segment white. Legs black; coxæ and bases of femora greyish-white; knee spots distinct.

Length of ♀ 5·5 to 6 mm.; of ♂ 4 to 5 mm.

Habitat.—Naini Tal, India.

Observations.—A purely sylvan species, easily told from its nearest ally *C. fatigans* by the abdominal ornamentation.

Culex fatigans. (Wiedemann.)
Culex aestuans. (Wied.)
Culex pungens. (Wied.) ?
Heteronycha dolosa. (Arribalzaga.)

'Auss. Zweif. Ins.,' p. 10, Wiedemann, &c.; 'Mono. Culicid.,' ii, p. 151 (1901), Theobald.

Thorax brown, with two distinct dark lines on the denuded surface, covered with pale golden curved scales, with two more or less bare parallel dark lines and three rows of dark bristles. Abdomen dark brown to black, with basal white or pale creamy curved bands and white lateral spots. Legs brown; knee, and sometimes the apex of tibia, with a pale spot.

Length of ♀ 4·5 to 5·5 mm.; of ♂ 4 to 5 mm.

Habitat.—Generally over India and most tropical and sub-tropical countries and even in warmer temperate countries. Subject to much variation, but easily told from its nearest ally, *C. pipiens*, L., by the relative greater length of the stem of the first sub-marginal cell.

The species will probably have to be divided up into a number of sub-species. Some of these I have mentioned in the 'Monograph of Culicidæ' (pp. 156–189). It is the chief Filaria carrier.

It is one of the commonest household pests in warm climates.

Culex quasipipiens. (Theobald.)

'Mono. Culicid.,' ii, p. 136 (1901), Theobald.

Thorax brown, with narrow golden curved scales; abdomen brown, with white or pale creamy curved basal bands, last segment often entirely pale scaled. Legs unbanded brown; knee spot pale. Wings like *C. pipiens*, but the stem of first sub-marginal cell longer, and the relative positions of the sub-costal and costal junction with the base of the first sub-marginal cell different, and the thoracic scales broader.

Length of ♀ 5 mm.

Habitat.—Sambalpur (C.P.), India.

Observations.—Very like *C. pipiens*, but differs in wing venation and in scale structure. *C. pipiens*, L., has so far not been observed in India.

Culex angulatus. (Theobald.)

'Mono. Culicid.,' ii, p. 324 (1901), Theobald.

Thorax deep brown, with narrow curved dull golden-brown scales; pleuræ pale. Abdomen dark brown, with yellow basal bands with a triangular expansion in the middle of each. Legs long and thin, *Habitat.*—Naini Tal.

Observations.—Very like *C. fatigans*, from which it can be told by the relatively longer legs, smaller thoracic scales, and abdominal ornamentation.

Genus *Panoplites*. (Theobald.)

'Mono. Culicid.,' ii, p. 173 (1901), Theobald.

Three species of this genus occur in India. They may easily be identified from other culices by the broad asymmetrical wing scales. The table below will be sufficient to identify them:—

A. Thorax unspotted. *uniformis.* (Theobald.)
B. Thorax spotted.
  Yellowish-brown; wings with border-scales broad and asymmetrical. *annulifera.* (Theobald.)
  Blackish-brown; wings with border-scales narrow. *annulipes.* (Walker.)

1. *Panoplites uniformis.* (Theobald.)

Panoplites Africanus. (Theobald.)

'Mono. Culicid.,' ii, p. 180 (1901), Theobald.

An abundant species in South India, and also occurs in the Malay Peninsula.

I feel certain now that the Panoplites from Africa that I have described as *P. Africanus* ('Mono. Culicid.,' ii, p. 187) is only this species. Undoubted *P. Africanus* have been sent me by Mr. Green from Ceylon. The African form is very variable, and I now find the same of the Indian.

2. *Panoplites annulifera.* (Theobald.)

'Mono. Culicid.,' ii, p. 183 (1901), Theobald.

Occurs all over India, Malay Peninsula, and East Indies. It has also been recently sent me from Manila. Easily told from the following by its much paler hue, smaller size, and more banded and spotted appearance of the legs.

3. *Panoplites annulipes.* (Walker.)

C. dives. (Schiner.)

C. nero. (Doleschall) ?

'Proc. Linn. Soc. Lond.,' 1, p. 5 (1857), Walker; 'Mono. Culicid.,' ii, p. 185 (1901), Theobald.

Malay Peninsula, and does not seem to occur in South India. Much darker and larger than the former.

Genus *Tæniorhynchus.* (Arribalzaga.)

'Dipt. Argentina,' p. 47 (1899), Arribalzaga; 'Mono. Culicid.,' ii, p. 190 (1901), Theobald.

A single species of this genus occurs in India. The chief character of the genus as modified by me is the presence of dense thick elongated wing scales either ending obliquely, or bluntly pointed.

Tæniorhynchus ager. (Giles.)

'Entomologist,' p. 196, July (1901), Giles; 'Mono. Culicid.,' ii, p. 199 (1901), Theobald.

Thorax deep chestnut-brown, with scattered golden scales, almost white over the roots of the wings. Abdomen black, with apical creamy bands. Legs ochraceous, with black and white scales, giving them a mottled appearance; tarsi basally pale banded on the fore legs, apically and basally on the mid and hind legs.

Length of ♂ 4·5 mm.; of ♀ 5 mm.

Habitat.—Madras and N.W. India.

Observations.—This banded proboscis species can at once be told from other Indian Culicidæ by the dense wing scales.

Genus *Aedeomyia.* (Theobald.)

'Mono. Culicid.,' ii, p. 218 (1901), Theobald.

Palpi short in both sexes. Separated from *Aedes* on account of the oad asymmetrical wing scales like Panoplites. A single species only occurs in this genus.

Aedeomyia squammipenna. (Arribalzaga.)
Aedes squammipennis. (Arribalzaga.)

'El Nat. Arg.,' 1, 151, 3 (1878), and 'Dipt. Arg.,' p. 62 (1891), Arribalzaga; 'Mono. Culicid.,' ii, p. 219 (1901), Theobald.

Thorax brown, with scattered creamy-yellow scales in the middle, and with white scales at the sides and behind; scutellum ochraceous, with black scales at the sides and creamy ones in the middle; abdomen brown, with two patches of creamy scales apically and two patches of white scales basally, apical segments yellow scaled. Legs banded, covered with creamy, purple and white scales, apices of mid femora

Length of ♀ 4 to 4·5 mm.; of ♂ 3·5 mm.

Habitat.—South America and India generally.

Observations.—I can see no difference between the Indian and South American specimens. The insect is very marked, and can at once be told by its densely-scaled dark mottled wings and leg tufts.

Genus *Uranotænia.* (Arribalzaga.)

'Dipt. Argentina,' p. 63 (1891), Arribalzaga; 'Mono. Culicid.,' ii, p. 241 (1901), Theobald.

Told from other Aedes by the presence of flat scales on the mesothorax and scutellum, swollen mid femora, and by the very small fork-cells. A single species represented by two ♂'s has been found in India.

Uranotænia minima. (Theobald.)

'Mono. Culicid.,' ii, p. 262 (1901).

Thorax deep brown (denuded), with long black bristles; metanotum with a pale median line. Abdomen dark-brown, with narrow basal bands of pale yellowish-brown; pleuræ and coxæ very pallid.

Length.—1·8 to 2 mm. (♂).

Habitat.—Quilon, South India.

Observations.—I have only seen two ♂'s of this species, both denuded of scales. They are, however, I feel certain, *Uranotæniæ*, but the fork-cells are a little longer than usual in this genus.

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PRE-SERVICE SURGEONS.

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Notes on the Medical Officers serving the Company prior to the formation of the medical services.

IN a former article entitled "Notes on the History of the Bengal Medical Service," published in the *Indian Medical Gazette* for January and February 1901, I gave a summary of the history of that service, from its foundation on the 1st January 1764 to date, with short notices of the three most famous Surgeons serving before that time, Boughton, Hamilton and Holwell. The present article is an endeavour to give a brief sketch of the Surgeons serving before 1764, with some notes on medical matters in general up to the same date. For the period from 1684 to 1717 I have been able to extract a quantity of information, chiefly from Wilson's "Early Annals of the English in Bengal,"[1] and Colonel Yule's notes to the Diary of William Hedges, Governor of Bengal, from 1682 to 1684.[2] For the period from 1748 to 1766 also I have been able to collect a good many notes from Long's "Early Records,"[3] Broome's History of the Bengal Army,[4] the Consultations of the Council of Fort William, 1753-1759, and other sources. For the thirty years, from 1718 to 1748, I have hardly any information, except about Holwell, and what I have been able to gather from the Parish Register of St. Anne's[5] from 1715 to 1758. This register records only births, marriages, and deaths. It contains the names of forty-one Surgeons, but many of these are noted as Surgeons of ships lying in the river; some of these also, who are not specially so described, and whose names I have given, may have been ship Surgeons also. Almost all the English ships, however, which then visited Calcutta, were in the service of the East India Company; and, as some of these notes show, there was a frequent interchange of duties between the Surgeons of ships in the Europe trade, and those serving in the Company's factories in India. There was then no furlough for the Company's servants in India, a man who wished to revisit Europe had to resign the service, though he might be, and apparently, if he wished it, usually was, reappointed on his return. The cost of a passage to England was then a very large sum, so medical officers found it a convenient and cheap way of going home to take the appointment of Surgeon to an Indiaman for the homeward voyage, when the Surgeon who came out on the ship was willing, as was often the case, to take an appointment in India.

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[1] "The Early Annals of the English in Bengal, being the Bengal Public Consultations for the first half of the Eighteenth Century;" summarized, extracted, and edited, with introductions and illustrative addenda by C. R. Wilson, M.A., Bengal Educational Service. London: W. Thacker & Co., Vol. I, 1895, Vol. II, Part I, 1900.

[2] "The Diary of William Hedges, Esq. (afterwards Sir William Hedges) during his Agency in Bengal, as well as his voyage out and return overland (1681—1687)." Transcribed for the Press, with introductory notes, &c., by R. Barlow, Esq., and illustrated by copious extracts from unpublished records, &c., by Colonel Henry Yule, R.E., C.B., LL.D., President of the Hakluyt Society. Vol. I. The Diary with Index. London: Printed for the Hakluyt Society, Lincoln's Inn Fields, W. C., 1887, Vol. II, 1888, and Vol. III, 1889, Illustrative Documents.

[3] "Selections from unpublished records of Government for the years 1742 to 1787 inclusive, relating mainly to the social condition of Bengal, with a map of Calcutta in 1784." Published under the sanction of the Government of India, Calcutta, Office of Superintendent of Government Printing, 1869, Vol. I. (Second volume never published, but the work was continued by Seton Karr in five volumes.)

[4] "History of the Rise and Progress of the Bengal Army," by Captain Arthur Broome, Vol. I. Calcutta: W. Thacker & Co., 1850. (No more volumes were ever published.)

[5] St. Anne's, the first Church in Calcutta, completed in 1709. It was situated to East of old Fort William, and was destroyed at the capture of Calcutta in 1756.

As in my former article, these notes refer chiefly to Bengal, though several medical officers serving in the other Presidencies are mentioned.

Abel Price.—The first Surgeon in the Company's service whose name I have come across ended his career and his service on the block. In February 1623 the Dutch captured the English Factory, belonging to the London E. I. Co., at Amboyna, on the island of Ceram, in the Malay Archipelago, between Celebes and New Guinea. Most of the prisoners, including ten Englishmen, one Portuguese, and nine Japanese, were beheaded, among them Abel Price, Surgeon. The lives of a few of the prisoners were spared. Dryden wrote a tragedy on the subject of the massacre at Amboyna (Bruce, Vol. I, pp. 246—248).

The next Surgeon in the Company's service, in point of date, whose name I can give, was the famous *Gabriel Boughton.* In my previous article I gave the story of his services to the Company; and how, after his cure of Shah Jahan's daughter, he obtained, as a reward for his services, liberty for his employers, the E. I. Co., to trade with Bengal, as it is usually told. I regret to say that there appears to be little truth in the Boughton legend, though it appears in one history after another, and indeed, was current in Bengal within a quarter of a century of Boughton's death.

Bruce, in his "Annals of the East India Company" published in 1710,[1] gives the story as follows (p. 406):—

"The Surgeons of the English Indiamen had acquired, for their skill in curing the disorders of the principal Mogul officers, a reputation, which made them known at court. Assalat Khan, a nobleman of high rank, applied to the Presidency of Surat to recommend a Surgeon to reside at Agra, and they selected Mr. Gabriel Boughton, Surgeon of the Company's ship *Hopewell,* for that duty, who was afterwards appointed Surgeon to the Emperor. His success gave the English an influence in the Mogul's Court which, in the sequel, we shall find to be the source of the valuable privileges which the London Company acquired in Bengal."

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[1] "Annals of the Honourable East India Company, from their establishment by the Charter of Queen Elizabeth, 1600, to the Union of the London and English East India Companies, 1707-8," by John Bruce, Esq., M.P. and F.R.S., Keeper of His Majesty's State Papers, and Historiographer to the Honourable E. I. Co., London. Printed by authority of the Honourable Court of Directors, by Cox, Son and Baylis, Great Queen Street, and published by Black Parry, and Kingsbury, Booksellers to the Hon'ble E. I. Co., Leadenhall Street, 1810 Three volumes.

The date of Boughton's deputation to Agra is put by Bruce in the year 1644-45. It will be seen that Bruce makes no mention of the accident to the Emperor's daughter.

Stewart, in his "History of Bengal,"[1] published in 1813, gives (pp. 251-252) the story at greater length than Bruce, and introduces the usual embellishments. He gives the date as 1636 (1046 by the *Hijra* era), and tells the story of the daughter of Shah Jahan being badly burned in the Emperor's camp in the Dekkan, and cured by Gabriel Boughton, Surgeon of the *Hopewell.* He further states that Boughton asked, as his reward, liberty for the English to trade in Bengal, that he went overland to Pipli, and there started the first English factory in Bengal, with the aid of "an English ship happening to arrive in these parts." Stewart further states that Boughton proceeded to the court of Shah Shuja, the Emperor's son, Viceroy of Bengal, at Rajmahal, and there also cured one of the ladies of the harem.

On the subject of the *farman,* said to have been given by Shah Jahan to Boughton in 1636, Stewart writes: "I was not able to find a copy of the *farman* among the Indian records, but Mr. Bruce mentions that it is in the State paper office, and is dated 2nd February, 1633-34." In another foot-note at the same place (pp. 251-252) he writes, "See East India Records, Vol. XIV, p. 22." Yule (Vol. III, p. 183) says of this reference in 1889: "Nothing corresponding to this reference can now be traced in the India Office."

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[1] "The History of Bengal, from the first Mohammedan invasion until the virtual conquest of that country by the English, A.D. 1757"—by Charles Stewart, London, Black, Parry & Co., Leadenhall Street, Booksellers to the Hon. E. I. Co. Watts, printer, Buxbourne, 1813.

Colonel Yule in his notes to Hedge's Diary devotes a good deal of space to the legend of Gabriel Boughton. After quoting (Vol. III, pp. 167-168), the account given by Stewart, he says, that this is the earliest version of the story in its completeness which he has been able to find, and that he cannot trace it to any older authority. Dow, in his "History of Hindustan,[1] published in 1772, gives the story of the accident as occurring in 1643, which is about the time when Gabriel Boughton went to Agra, but does not mention him as having anything to do with it; on the contrary, he says that the girl was cured by Anitulla, the most famous physician of the age, who was brought express from Lahore for the purpose. The mission of Boughton, and the fire accident to the lady, appear to have got mixed up, and the accident located in a camp in the Dekkan, on account of the obvious improbability of a Surgeon from Surat reaching Agra in time to be of any use.

Yule also (Vol. III, p. 183) quotes the legend of Gabriel Boughton as follows:—

"I also find from a MS. discourse by J. B., a Captain of a Company's ship, who was in India *circa* 1770-1780—(which I have seen just as this sheet is going to press, and which I have the owner's permission to quote,) that the story of the acquisition of privileges for his countrymen by Gabriel Boughton (there called Bowden) was then current, though some of the particulars are given differently. Indeed, this MS. curiously illustrates the inexactitude of even twenty years' tradition. For it seems impossible that Mir Jumla, who did not come to Bengal till 1759, should have been the Mahommedan patron from whom Boughton (who died some years earlier) obtained trading privileges for his countrymen.

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[1] "The History of Hindustan, from the earliest account of time to the death of Akbar; translated from the Persian of Mahummud Casim Ferishta of Delhi, together with a dissertation concerning the religion and philosophy of the Brahmins; with an appendix containing the history of the Mogul Empire in its decline in the reign of Mahmmud Shaw to the present times." By Captain Alexander Dow. 3 vols., 4° London, 1768—1772 (an Earlier Edition, in two volumes, was published in 1768).

"The passage in J. B.'s MS. runs as follows:

"In the before mentioned places in these three kingdoms (ORIXA, BENGALA, and PATTUNA, *i.e.*, Behar) the English nation in generall hath freedome of inhabiting and tradeing, free from all manner of taxes and customes, in or out, the like priviledges hath noe other Nation besides.

"All which was procured by the Ingenuitie of Mr. GABRIEL BOWDEN (one of our owne Nation) and a very eminent Doctor of Phisick, sometime Doctor in Ordinary to the great Warriour EMIR JEMLA, who took a very great affection towards him and was most courteous and ffree to him, and especially upon a Notable Cure of his owne Lady performed (Under God) by the Doctor, the Nabob callinge for him ordered him att that instant to demand what he would have given him or had most likeinge to, and it should be granted in consideration of his loyal service and care of the best of his familie. The Doctor highly surprised with this great Person's generositie, soone considered upon it, yet soe as not to be greedy of any present Gaine (onely for himselfe) and now in the best of time, requested that the ENGLISH Nation might settle factories in what parts of the Kingdomes they pleased and be free off all duties and customes, which was then 4 percent in and the like out for all the goods dealt in, the which was noe sooner demanded but as readily granted, with *Phyrmands* in the PERSIAN Languadge that the ENGLISH Nation shold hold that Priviledge soe longe as they pleased to live and settle in these Dominions, and many other rewards Liberally bestowed upon the Doctor (one being very rare among the Mahometants.)"—But here this part of the MS. breaks off.

What is really known about Boughton is given by Wilson (Vol. I, pp. 23—28). Gabriel Boughton was sent from Surat to Agra in 1645, at the special request of Asalat Khan, a nobleman at Shah Jahan's Court, acquired great influence by his professional services, and stood high in favour with the Emperor's son, Shah Shuja, whom he accompanied to Bengal when he was appointed Viceroy. The accident to Shah Jahan's daughter, the Princess Jahanara, by her clothes catching fire happened in 1643-44, more than a year before Boughton reached Agra.

It is doubtful whether Boughton secured any grant for the English. We last hear of him as alive in 1650. Bruce states (I, 56) that Shah Shuja gave the English a *farman* in 1651-52. The original document was lost by Mr. Waldegrave in a journey overland from Bengal to Madras. A copy is dated 1656.

On the whole, it appears probable that Boughton did get a grant, not from Shah Jahan, but from Shah Shuja. But even this is by no means certain.

Whether Boughton ever did anything for the Company or not, it is quite certain that they entertained great hopes of his doing so. Yule (III, 187) quotes a letter from the Masulipatam Agency, sending a *peshkash,* or propitiatory offering, to Boughton, for his favour at Shah Shuja's court. Yule also (III, 188) quotes a letter from home to the Council of Fort St. George, dated 31st December 1657, which states that Boughton's widow, having married William Pitts, a servant of the Company stationed at Hughli, is making claims against the Company, which they repudiate.

Both Bruce and Stewart describe Boughton as Surgeon of the *Hopewell.* Whether he was on the *Hopewell* or not, this ship, curiously enough, is connected in quite a different way, through a different individual, with the first visit of the English to Bengal. In March, 1663, John Norris, Agent at the English Factory at Masulipatam, despatched a party of eight Englishmen in a country boat to the Court of Agha Muhamad Yaman, Viceroy of Orissa, who gave them permission to trade in Orissa, and under this permission they founded factories at Balasore and Hariharpur. One of this band of eight, the first Englishmen to visit Bengal, or at least Orissa, was William Bruton, Quarter-master of the *Hopewell,* who wrote an account of the expedition.[1]

A list of the Company's servants on the Coast (Madras), and in the Bay (Bengal), in 1652, probably the oldest such list in existence, shows two medical officers. At Madraspatam—Edward Whiting, Chyrurgeon. In Pegu—Samuell Archer, Chyrurgeon (Yule III, 196).

John Fryer, M. D., travelled in India and Persia as a Surgeon in the Company's service from 1672 to 1781, and wrote an account of his travels published in London in 1698 in a large folio volume.

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[1] "News from the East Indies of a voyage to Bengalla," written by William Bruton, now resident in the Parish of St. Saviour's, Southwark, and now lately come home in the good ship called the *Hopewell* of London, imprinted at London by I. Okes, 1638 (reprinted in Volume VIII of a collection of voyages and travels published by Osborne in 1752, and also in Vol. V of the Enlarged Edition of Hakluyt in 1809—12).

Ralph Harwar is mentioned as resigning in 1676 and being succeeded by Robert Douglas. Yule (II, 125) quotes from Streynsham Master's Diary as follows: "Dec. 15th, 1676, RALPH HARWAR, Chirurgeon of this factory (BALASORE), desiring to return home for England by these ships, and Mr. ROBERT DOUGLAS, the Chirurgeon of the *Eagle* being willing to accept of this employment, and Captain BONNILL, his commander, consenting that they should change births, the Councell did also approve thereof." Hedges mentions Harwar as being again in Bengal, in Hughli, in his diary on 27th August 1784, and again mentions him on 25th and 27th November 1784. Apparently he came out again, after a spell at home, and succeeded Douglas, his former relief, in turn.

Robert Douglas came out as Surgeon to the *Eagle*, in which Streynsham Master came to Bengal in 1676, and, as mentioned in the last paragraph, succeeded Ralph Harwar as Surgeon at Balasore and Hughli. He went in largely for private trade. Hedges mentions him as a habitual trafficker with interlopers, for which he was dismissed in 1684. He joined Hedges in chartering the *Recovery* for the Persian Gulf, and left in her with Hedges at Christmas 1684, going home overland from the Persian Gulf *viâ* Baghdad. Douglas appears subsequently in 1699 as supercargo of the *Macclesfield* galley, sent by the new (English) Company to China. His wife was a sister of the wife of Thomas Pitt, the famous interloper, Governor of Madras, from 1697 to 1709, importer of the Pitt Diamond and grandfather of William Pitt, Earl of Chatham.

Henry Watson. A letter from Court dated London, 26th November 1684, makes the following appointment: "Mr. Henry Watson is likewise entertained to serve ~~as,~~ us as a Chyrurgeon's mate at Hughly or Cassumbazar (where there is most need of him) for five years at 25 rp. a month for the first two years and 30 rs. a month for the last three years."

The New Company sent out their first batch of servants to occupy Hughli, abandoned by the Old Company after the foundation of Calcutta by Job Charnock in 1690, in the *Antelope* in 1699. Between September and December 1699, no less than seventeen of the New Company's servants died, mostly in the *Antelope,* on the voyage. Among them were Fulk Lacey, Surgeon (apparently of the ship) on 5th September 1699; Henry Bigland, Surgeon's assistant, on 30th August 1699; and *Thomas Pendleton,* "our designed Chyrurgeon in the Bay," in December 1699 (Yule II, 206).

Dr. Heathfield is mentioned in Hedges' diary as Surgeon of Fort St. George in 1685. He died about 1691.

Edward Bulkeley was appointed Surgeon to Fort St. George, in succession to Heathfield, deceased, about 1690-91. He was a famous naturalist in his time. In 1698 he was appointed a Justice of the Peace. He remained in the service as Surgeon till 1708; in 1709 he was appointed "Land Customer" and sixth of Council; in 1710 he appears as Storekeeper and seventh of Council; in 1711-12 as Paymaster and fifth of Council, after which his name drops out of the list. (Yule II, 320-321).

Bruce (III, 154) relates how the Moguls endeavoured to get possession of the Company's Settlements on the coast in 1693-94, through the treachery of *Dr. Blackwell*, one of the Company's servants, from his name, I am sorry to say, apparently a Scotsman. "Fort St. David, being the weakest was first thought of, and the Surgeon of the place a Dr. Blackwell, who had, from his profession, got access to the Mogul's camp, became, for a large bribe, the instrument of the enemy; in return, he was to be made Governor of Porto Novo, and to hold it under the Mogul's protection. Blackwell's treason was fortunately discovered, and he was seized and carried to Madras, where he made a full confession." It is not stated what became of Blackwell. Apparently he was sent for trial to England. The Company had not then power of life and death over Europeans, so Dr, Blackwell probably escaped the fate he so richly deserved.

William Warren came out as Surgeon to the Old Company in 1700-02, and was taken into the service of the United Companies on 16th February 1704, on a salary of £36 per year. He begs that the Old Company will not on that account stop his allowances as he still has 23 of the Old Company's servants to look after. The Old Company's Council agree that his stated salary may be allowed him, but no further benefits from the Old Company (Consultations of 22nd July 1704, Wilson 1, 235).

The Revd. B. Adams, Chaplain of Fort William, mentions Warren in a letter home, as follows: "That adulterous marriage of WILLIAM WARREN, Surgeon to the Factory at Calcutta, with ELIZABETH BINNS, a widow there, tho' admonish'd, caution'd and advised to the contrary, when she, and everybody that knew Mr. WARREN knew also that he was marryed to another woman, who would have come out to him, if he had had a mind to it. But it seems that the obligations of marriage, or anything else, are of little consideration with Mr. WARREN, being a man of most pernicious principles and debaucht manners." (Wilson I, 201). It is not clear how, under the circumstances, Warren got his marriage solemnized.

About the same time the Court, in a letter to Bengal, dated 16th December 1699, write: "If Doctor WARREN be an industrious honest able man, we leave it to you to make his salary up to £36 per annum. We have not heard from his wife as yet, but whenever she desires it, we will give her leave to come over to him on our shipping." (Yule II, 330). Yule also quotes Mr. Adam's letter, which is not dated. History does not relate whether Mrs. Warren came to India or not. If she did, it would have been interesting to see the meeting between the three; and William Warren, whatever his sins, probably paid for them in full. In the list for December 1706, Warren is said to have "laid down the service" since the preceding year.

In June 1702 the New Company established a factory at Pulo Condore, off the Coast of Cochin China, under Allen Catchpoole as President. On the night of 2nd, 3rd March 1705 the Malays rose and murdered Catchpoole, and several of the other English officers. Those who escaped on that occasion were almost all killed in a second massacre on 10th May, among them *St.* (Stephen?) *Paul*, Chirurgeon (Yule II, 341).

In August 1705, a second Surgeon, *Michael Gray*, was appointed to assist Dr. Warren in Consultations, August 20th, 1705. "The place Calcutta—and season being very sickly renders it impossible for one Doctor to attend all the sick, and that none may perish for want of due attendance in sickness, there being no mates nor assistants to Dr. Warren, and he very sick, 'tis unanimously agreed that Mr. Gray, who was Surgeon to Metchlepatam Factory for the New Company, be taken into the United Trade Service at the same salary that Dr. Warren has, but Dr. Warren to have precedence, having served the longest time in India."

Dr. Lewis Demenny appears as witness to a will in Calcutta, of Mr. John Masters, fourth in Council, on 1st November 1708. His name again appears as Surgeon to the *Howland,* which reached Calcutta on 30th December 1710.

Dr. Phillip Richardson appears as receiving a legacy from William White, merchant, on 26th May 1710. His name is not in the lists from 1712 to 1715, he apparently went home and came out again, for Dr. Phillip Richardson, the Factory Surgeon, and *Mr. John Parney,* the Assistant-Surgeon, being both in very bad health, were given their discharge in order that they might try change of air on 11th January 1717.

James Richardson, Surgeon, resigned in January 1711. Possibly the Christian name may be a mistake, and he may be the same as the Phillip Richardson mentioned in 1710 and 1717.

William James came to Bengal as Surgeon to the *Bouverie* on 13th January 1710, and was appointed Surgeon to the Settlement in succession to James Richardson in January 1711. He returned to England in February 1713. He was appointed to accompany the Embassy to Delhi, but did not go. In a list of the Company's servants in the Bay in November 1711 appear the following names:—

William James—going up with the King's present.

William Hamilton—at Culcutta (*sic*).

William Hamilton, the next name on our list, is probably the most famous name among all the medical officers who have ever served in India, and certainly is that of the Surgeon who has been the greatest benefactor of his country. The Boughton legend may be for the most part apocryphal, but there is no doubt of the truth of the story of William Hamilton. That story, as told in my former article, is, I think, in the main correct, except as regards the statement that Hamilton was detained by the Emperor at Delhi after the other members of the Embassy were permitted to return to Calcutta. Whatever difficulties he may have met with as to his being allowed to accompany the other members, he did accompany them. The Embassy on its return was received at Tribeni with great pomp, by the President, Robert Hedges, and four of his Council, about 20th November 1717. Hamilton died in Calcutta on 4th December 1717. He made his will, on the return journey, on 7th October 1717, at Surajgarh, a small town on the south bank of the Ganges, twenty miles west of Monghyr. The will, which is given in full by Wilson (II, 293-294), is witnessed by John Cockburne and John Sturt. These names are not among those of the members of the Embassy, but they may have been those of men who accompanied the Embassy, when on its return journey, from Patna to Calcutta. That the Emperor may have desired to retain Hamilton's services as his personal physician, and that he was only allowed to leave on promising to return after a visit home, is probable enough. Indeed, the fact that he had difficulty in getting away is distinctly asserted on his tombstone, which is certainly a contemporary record "*ba hazar* *watan-i-khud hasil namuda.*" But it appears certain that he did accompany the other members of the Embassy on their return journey, his death taking place only a few days after their arrival in Calcutta.

William Hamilton belonged to the family of Hamilton of Dalzell, and came out to India as Surgeon of the frigate *Sherborne.* The whole ship's company appear to have been in a state of chronic mutiny. Hamilton was not on good terms with the Captain, Henry Cornwall, and after standing by him in one mutiny, closed his naval career by deserting at Madras on 3rd May 1711. He made his way to Calcutta, and was there appointed Second Surgeon to the Settlement on 27th December 1711. "We being in great want of another Surgeon for to tend all the Honourable Company's servants and soldiers of this garrison, and William Hamilton being out of employ, agreed that he be entertained upon the same allowance and priviledges as William James our present Surgeon." (Consultations 27th December 1711). In the list of salaries paid at Michaelmas 1712 appear the names of the two Surgeons :

William James, Surgeon, half-a-year at			**£36**	**Rs. 144**
William Hamilton	**do.**	**do.**	**£36**	**Rs. 144**

The Surgeons came in the list of Company's servants between the factors and writers.

In 1714 was despatched the famous Embassy. In the Consultations of 5th January 1714, Mr. John Surman was appointed chief of the Embassy, Mr. John Pratt second, Mr. Edward Stephenson third, with Hamilton as medical officer. "It being necessary one of our Surgeons go up with the gentlemen who go with the present, agreed therefore that Dr. Hamilton be sent." Again—"Ordered that Rs. 350 be allowed

Hamilton to provide themselves with clothes, &c., necessarys for their proceeding to the Mogull's Court with the Present and that the Buxey pay the same." (Consultations 26th February 1714). Subsequently Pratt was excused, and "Coja Serhaud" (Khwaja Sarhad), an Armenian merchant, was appointed second in the Embassy, and general adviser. The list of the Company's servants in Bengal for 18th January 1715 gives the names of all who actually went, as follows:—

Factor John Surman, arrived 19 August 1707. Chief in ye Negotiation.

Factor Edward Stephenson, arrived 2 February 1709-10. Gone with ye present.

Surgeon William Hamilton, arrived 27 December 1711. Gone with ye present.

Writer Hugh Barker, arrived 17 August 1711. Gone with ye present.

Writer Thomas Phillips, arrived 19 November 1711. Gone with ye present.

Out of six factors in the list, Surman stands first, Stephenson 5th; out of 23 writers, Barker stands 11th, Phillips 14th.

The Embassy started in April 1714, remained for a long time at Patna, left Patna on 19th April 1715, and on 4th September 1715, news was received at Calcutta that the Embassy had reached Delhi. On 9th January 1716 the news of Farakhsiyar's cure reached Calcutta. "Last night we received a packet from Messrs. Surman and Stephenson at Dilly, dated December the 7th. In their letter they advise on the welcome news of the King's recovery, as a clear demonstration of which He, according to the Eastern manner, washed himselfe the 23rd Ultimo and received the Congratulations of the whole Court on the 30th December. He was pleased to reward Mr. Hamilton for his care and success in a publick manner, presenting him with a Vest, a *Culgee*[1] set with precious Stones, two Diamond Rings, an elephant, horse, and five thousand Rupees, and has ordered several additions to be got' for him.[2] Coja Seerhaud received at the same time an Elephant and Vest as a Reward for his attendance. They delivered to his Majestie the remaining part of their Present, reserving a small part only till the ceremony of his Majestie's Marriage should be over. The General Petition they had delivered to Cawn Dora in Order to have it presented his Majestie" (Consultations January 10th, 1716). It seems wonderfully quick work for a letter to have come from Delhi, to Calcutta in 33 days, 7th December to 9th January; but the next was even shorter, thirty days. The Embassy remained at Delhi for a year and a half longer, possibly detained by Farakhsiyar's reluctance to part with Hamilton. On 17th July 1717, news was received by a letter, dated 17th June 1717, that the Embassy had had their farewell audience of the King on 30th May, and were preparing to start on their return journey. (Consultations, 18th July 1717). They reached Tribeni, as stated above, about 20th November 1717.

Stewart (pp. 397-398) gives the requests made by the Embassy, and granted to Hamilton as follows: The petition "was at length presented in the month of January" (1716—this should be December 1715) "and besides various subjects of complaint from Bombay and Madras, stated the numerous impositions practised by the Nawab of Bengal and his inferior officers. It therefore prayed.

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[1] *Culgee*, *Khalji*, a turban ornament.

[2] Stewart states (pp. 397-398) that "among the presents given to Mr. Hamilton on this occasion, were models of all his surgical instruments made of pure gold."

"That a *dustuck*, or passport, signed by the President of Calcutta, should exempt the goods it specified from being stopped or examined by the officers of the Bengal Government under any pretence.

"That the officers of the mint, at Moorshedabad, should at all times, when required, allow three days in the week for the coinage of the English Company's money.

"That all persons, whether Europeans or natives, who might be indebted or accountable to the Company, should be delivered up to the Presidency at Calcutta, on the first demand.

"That the English might purchase the lordships of 38 towns with the same immunities as the Prince Azeem Ooshan had permitted them to buy Calcutta, Chuttanutty, and Govindpore."

Hamilton died on 4th December 1717, and was buried in the old Churchyard at Calcutta, in the ground where St. John's Church now stands. When the ground was cleared to build that church in 1787, his tombstone, which had fallen down, and had been covered with earth and forgotten, in the 70 years which had elapsed since his death, came to light. Warren Hastings suggested that the lettering should be gilded, and the stone set up in the entrance hall of the church. This suggestion was not carried out. The stone was set up in Job Charnock's tomb, at the north-west corner of the grounds of St. John's, where it may still be seen. The epitaph is twice repeated, in English and in Persian. The English part runs as follows:—

"Under this stone lies interred the body of William Hamilton, Surgeon, who departed this life the 4th December 1717, his memory ought to be dear to his nation for the credit he gained y^{e} English in curing **FERRUKSEER** the present KING of INDUSTAN, of a Malignant Distemper by which he made his own name famous at the Court of that Great Monarch and without doubt will perpetuate his memory as well in Great Brit^{n} as all other nations in Europe."

The following is a literal translation of the Persian epitaph: "William Hamilton, Surgeon, servant of the English Company who had gone along with the English Ambassador to the Illustrious Presence and had raised his name high in the four quarters of the world by reason of the cure of the King of Kings the asylum of the world Muhammad Farakh Siyar the Victorious, with a thousand difficulties having obtained from the Court of the Asylum of the World leave of absence to his native land by the decree of God on the 4th December 1717, died in Calcutta, and in this place was buried." [1]

Richard Harvey arrived in Calcutta on 20th January 1712 as Surgeon to the *Recovery*, and was appointed Surgeon to the Settlement in February 1713, in succession to William James, gone to England. For two years afterwards, 1717—1719, Dr. Harvey "officiated in the Church service" in the absence of a *padre*. One wonders if William Warren ever officiated in this way for the Revd. Mr. Adams.

Benjamin Greene, Doctor's mate, died in Calcutta on 30th May 1712.

Thomas Stacey was in Calcutta in 1713. In the Consultations of 6th August 1713 appears the report of an autopsy made by William Hamilton and Richard Harvey, on the body of William Hall, who was killed by Jean Suin, a Frenchman. Suin was acquitted as having acted in self-defence, Hall being the aggressor,

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[1] Great part of above description of William Hamilton and the Embassy is taken from Wilson's "Early Annals."

IMPERIAL

along with two companions, Ensign John Brown, and Thomas Stacey, Doctor's mate.

Oliver Coult first came to Calcutta on 9th March 1708, as Surgeon of the *Hallifax.* He appears in the list of Company's servants in the Bay, on 8th January 1714 (1715), where the following Surgeons are mentioned :—

Richard Harvey, arrived in India, 1st January 1712	Pay £36
Oliver Coult, arrived in India, 7th September 1713	„ £36
William Hamilton, arrived in India, 27th December 1711	„ £36
	"gone with ye present."

Even in the beginning of the seventeenth century there appear to have been private practitioners in Calcutta. In the Consultations for 3rd November 1709 appears the following entry : "Mr. Blount brought in a Doctor's bill paid by Mr. Waldo for attendance and physic to her husband in his sickness, our Doctor being sick at that time. Ordered that the Buxie pay the same." (Wilson I, 323.) Buxie means Bakshi, *i.e.*, Paymaster. On 3rd March 1713 payment was made to a French Doctor of a bill for Rs. 34 for attendance on Mr. Edmund Mason, when both the Company's Doctors were "up the country." On 18th January 1717 a bill of Rs. 45-12, "which is not unreasonable," was paid to the Dutch Doctor at Chinsura for attendance on Mr. Thomas Cooke, who was taken ill when on duty at Hughli.

For the next thirty years all the information I have about Surgeons in Bengal, with the exception of Holwell and Gray, consists in the list of domestic occurrences from St. Anne's Parish Register as follows :—

Frazier, Thomas, Surgeon, died 21st October 1719.

Corbet, Benjamin, Surgeon, died at Cossimbazar, coming from Patna in 1724.

Goodwin, Dr., Richard Quelch, Dr. Goodwin's servant, died 30th December 1725.

Sturt, John, Doctor, died 1st December 1726. (Is this the same John Sturt who witnessed Hamilton's will ?)

Beal, William, Surgeon, died 28th August 1727.

Davis, Joseph, Surgeon, died 18th September 1727.

West, Robert, Surgeon, died 20th July 1729.

Dipping, Anthony, Surgeon, married Margaret Morphew, 2nd January 1734, and died six months later, on 22nd July 1734.

Lindsay, W., Surgeon, died of fever, 29th March 1742. (This name is not in St. Anne's Register; though another Surgeon of the same name died in Calcutta seven years later.)

Napier, Alexander, Doctor, died 25th November 1742.

Hook, Joseph, Surgeon, died 17th May 1748.

Cauty, John, Surgeon, died 17th June 1748.

Mackdonald, John, Surgeon, married Mary Askins, a country woman, 14th November 1749.

Linsey, William, Doctor and Inhabitant, died 27th July 1749.

Irwin, Christopher, Surgeon and Inhabitant, died 13th February 1751.

Hemming, John, Surgeon, died 13th October 1753.

John Zephaniah Holwell [1] came out to India as Surgeon to an Indiaman in 1732. If William Hamilton is the most famous, Holwell was assuredly the most successful of all the medical officers who ever served the Company. He was the son of a London merchant, and grandson of John Holwell, a noted mathematician, and Royal Astronomer. He was born in Dublin on 17th September 1711, and received his medical education as an articled pupil of Andrew Cooper, Senior Surgeon to Guy's Hospital. After his arrival in India, he went as Surgeon on Company's ships to Jedda and Mocha, and studied Arabic. He twice went in medical charge of the "Patna party," a body of about 400 soldiers, which went annually from Calcutta to Patna; afterwards served as Surgeon to the Dakka Factory; and was posted to Calcutta in 1736. He was chosen as Alderman to the Mayor's Court in 1736, and in 1740 was appointed Surgeon to the Hospital, but did not come on the regular list of Company's servants till 1742. A Council letter of 13th January 1749 reports: —

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[1] Much of this account of Holwell is taken from Busteed's "Echoes of Old Calcutta."

"In obedience to your commands of March 1742, we appointed Mr. John Zephaniah Holwell, one of your surgeons in this establishment, in the room of Mr. William Lindsay, who departed this life of a fever on the 29th of that month" (Long's Selections, No. 24, p. 51). It seems strange that an appointment should be reported seven years after it was made, and makes one suspect that there may be some confusion about the date of William Lindsay's death. Holwell became Principal Surgeon to the Presidency, and was twice elected Mayor. He went home in 1748. When in England he submitted to the Court of Directors a plan for the reformation of the Collector's Cutchery in Calcutta, as a result of which that appointment was given to him, and in 1752 he came out again as twelfth in Council and "*Zamindar*" of Calcutta, an office roughly corresponding to those now held by the

Commissioner of Police and Collector of Calcutta, and held that office up to the capture of Calcutta in 1756.

Holwell appears to have been a man of the most tremendous energy. The consultations of Fort William from 1752 to 1757, the years when he held the office of *Zamindar*, teem with notices of his reforming zeal. In 1752 he dismissed Govindram Mettre (Mittra), the "black *Zamindar*," his principal assistant, for heavy frauds. The majority of the Council reinstated Govindram, but made him refund Rs. 3,397, which he had embezzled. In the same year, 1752, Holwell took a census of Calcutta, which made the population 409,000, probably an immense over-estimate. On 29th December 1752, we find him reporting on the state of the accounts. On 30th April 1753, he complains of Mr. John Wood for rescuing one Mohun Persaud from his custody, as a result of which Mr. John Wood was deported to England. On 24th May 1753, he is reporting on an embargo laid by the Nawab at Kasim Bazar on the rice ships bound for Calcutta; and on the 10th June suggests alterations in the mode of conducting investments. On 25th July he proposes to measure the Company's ground, and on 26th July suggests the levy of a duty of five per cent. on the sale of houses belonging to Europeans, and the increase of taxation generally. On 8th December 1754, he rents Similia (Simla in Calcutta) for the Company, for Rs. 2,281 yearly. He had some idea of sanitary improvement, probably rare enough at that time in Calcutta, for on May 12th, 1755, he requested permission to repair and enclose the great tank and prohibit the washing of people and horses therein. This was the large tank now in the centre of Dalhousie Square; then, and for more than a century afterwards, it afforded the best drinking water available in Calcutta. On 4th September 1755 he asks for leave to England, quoting a despatch from the Directors at home "directing their servants to give one year's notice of their intention to quit India." He had much to go through before he was able to take this leave, a year and a half later! By this time he had risen to be seventh in Council.

In June 1756, Sirajaldaulat, the Nawab of Bengal, captured Calcutta, the surrender being followed by the ghastly tragedy of the Black Hole. I do not propose to repeat here this story, which is, or should be, well known to all, but merely to recount Holwell's share in the siege. After Drake, the Governor, had deserted the garrison,—surely an episode without parallel in English history,—Holwell by universal consent took over the conduct of the defence. In his evidence before the Parliamentary Committee which subsequently enquired into the matter, John Cooke of the Civil Service, one of the survivors of the Black Hole, says:—"As soon as it was known the Governor had left the Factory, the gate towards the river was immediately locked to prevent any further desertion, and the general voice of the garrison called for Mr. Holwell to take the charge of their defence upon him. A council being hastily summoned, Mr. Pearkes, the senior then on shore, waived his right to the Government in favour of Mr. Holwell, who thereupon acted in all respects as Commander-in-Chief, and exerted his utmost to encourage every one." An account of the Black Hole, quoted by Busteed from Orme, written by a junior civilian, contains the following quaint note upon Drake's desertion :—" Upon the Governor going off several muskets were fired at him, but none were lucky enough to take place." Most people will sympathize with the writer's regret at this bad markmanship.

Holwell tells us that Leech, the Company's smith, escaped when the Mogul's troops entered the Fort. At dark he returned, and told Holwell that he had got a boat, and could get him away. Unlike Drake, Holwell refused to desert the men under him, or rather the rest of the prisoners, as by this time they had surrendered. Leech thereupon said that he would stay too, and paid for his devotion with his life, being one of those who died in the Black Hole. Holwell subsequently describes the defence of Calcutta as " a tragedy of errors."

At least five other medical men, Fullerton, Gray, Knox, Taylor, and Ingles, were in Calcutta during the siege. None, except Holwell, were in the Black Hole. Ingles was killed during the siege. The other four were all taken prisoners, but subsequently escaped, and joined the other refugees at Fulta.

When the prisoners were confined in the Black Hole, Holwell seems to have been the only man who even for a time kept his head, offering bribes to the guards to release them, but without success. He was one of the 23 survivors, and, being known to have been the leading spirit in the defence, a member of Council, and the highest in rank among the survivors, he was taken by the Nawab in chains to Murshidabad. He was released towards the end of the year, made his way to Fulta, and at last got his long delayed leave ; going home in the *Syren*, a sloop of 80 tons, early in 1757, and writing his narrative on the way. While at home he was nominated to succeed Clive as Governor of Bengal, but waived his claim in favour of Mr. Massingham, and was appointed second in Council. Before he started, a new Board of Directors was elected, who cancelled these arrangements, and sent him out as seventh in Council. By the time he landed he had risen to fourth, by the departure of seniors; in 1759 he was second, succeeded Clive as Governor on 28th January 1760 ; but resigned the same year, on 27th July 1760, and returned to England for good.

A letter from the Court, at home, dated 25th March 1757, despatched before the capture of Calcutta was known in England, mentions a minute by Holwell about establishing a Residency at Agra, consideration of which is postponed, and praises his administration as *Zamindar*. The Court were of opinion that the revenues in Bengal had been greatly increased under the management of Mr. Holwell, without imposing any new duties, or oppressing the poor, and that he had acted with integrity and lenity in the judicial work of his office. They add Rs. 4,000 a year to his salary, in addition to his former salary of Rs. 2,000, in lieu of all fees and perquisites; and direct that he shall not rise to a higher station in Council without further orders.

That Holwell was a man fit for command was recognised by Clive, who, when Calcutta was altogether denuded of troops during the war with the Dutch in 1759, appointed him Colonel of the militia, consisting mainly of the European inhabitants, for the defence of the Fort and settlement. As it turned out, the militia were not actually called on to fight on this occasion ; but, had Forde been defeated at Biderra, the

English in Calcutta would, within a few days, have again been fighting for their lives.

After his return to India, in 1759-60, we again see numerous signs of Holwell's official activity in the consultations. On 13th February 1759, with Mr. Mapletoft, he asks, on behalf of the Provincial Grand Lodge of Masons, for payment of a bond for Rs. 2,475, which had been lost at the capture of Calcutta. In 1758 the Council resolved "that no European be suffered to purchase any of the Hon'ble Company's farms" (in the 24-Parganas). In spite of this we find Holwell purchasing two such farms, Medunmull and Ekaberpoor, when they were put up for sale by auction at the Town Hall, Calcutta, on 31st July 1759. He paid a fair price for them, Rs. 72,000; the upset price being Rs. 57,000. On 4th June 1759, a native syndicate had offered to farm the whole 24-Parganas at an advance of Rs. 1,10,001, on the rent of the previous year. Holwell advised the refusal of this offer, saying that he would willingly give Rs. 10,000 more himself, and that the farms were worth much more. His advice was justified by events, the total realized by the auction—at which he himself, as noted above, purchased the leases of two farms, being Rs. 7,65,700; an advance of more than two lakhs over the previous year's revenues, Rs. 5,46,044. During this period Holwell erected, at his own expense, a monument to the victims of the Black Hole, about the spot where their bodies were buried in, or rather flung into, the ditch round the Fort. This monument was pulled down early in the nineteenth century, but now, after many years, is being replaced.

Holwell lived in England for 38 years after his retirement. It says much for his constitution that, after surviving the Black Hole, the journey in chains to Murshidabad ~~after~~ during the rains, and 28 years' Indian service, he lived to the hale old age of 87. He died at Pinner, near Harrow, on 5th November 1798. He was the first medical officer serving in India to receive the honour of the Fellowship of the Royal Society.

Charles Weston.—Served for some time as an apprentice to Holwell, while the latter was surgeon to the Calcutta hospital. He afterwards became a merchant in Calcutta, and served as a juror at the trial of Nuncomar in 1775.

George Gray.—First appears in the parish register of St. Anne's as married to Mrs. Isabella Grayham (Graham ?) on 21st January 1734. On 1st September 1737 his son, George, is christened. He is then described as Surgeon to the Factory at Kashimbazar. In 1754 he was one of the Surgeons at Calcutta, an appointment which he held at least up to 1759. A despatch to Court, dated 7th December 1755, states that he had asked for an appointment as writer for his son George, which was given. This must have been a great favour, for appointments to the covenanted service were very rarely given in the country. This appointment, however, was justified by results, as George Gray, junior, was one of three writers who were granted two years' extra rank and service for good service in the defence of Calcutta. Both the George Grays, father and son, were taken prisoners during the defence of Calcutta, but prior to the final surrender, so were not in the Black Hole. Both subsequently escaped and joined the other refugees at Fulta. Dr. Gray's wife and infant son, Charles, were also among the refugees at Fulta.

John Bristow.—First appears in the parish register of St. Anne's as married to Elizabeth Mackay on 18th August 1850. In 1756 he was at Balasore. Holwell, in a letter to the Court of Directors, dated 30th November 1756, writes of him: "Bulramgurry, by its situation, having escaped the Government.'s notice, and by the prudent conduct of Mr. John Bristow (left Resident at Balasore by Mr. Boddam), is still retained." Bulramgurry was at the mouth of the Hughli near Balasore.

In the consultations of 28th April 1757[1] he was appointed Resident at Cuttack, during the war, on a salary of Rs. 150 per month. On 10th October 1757, is recorded the receipt of a letter from Mr. John Bristow, Resident at Cuttack, informing that he had raised the English flag in that city, that the house given for the factory is not capacious enough for the Company's trade, that Dedar Ally and Sheikh Manjee have offered a piece of ground fronting the river to build a house or fort, that for twelve or fifteen thousand rupees he can make a very complete factory, capable of resisting any country power; that he has visited Harryharpore, that there is a good manufacture of white goods there, and that twenty or twenty-five thousand rupees worth of goods may be disposed of to advantage. The consultations of 3rd July 1758 record his removal from the Cuttack Residency. "As Mr. Bristow's behaviour at Cuttack is not approved of by the Board, and as it is esteemed requisite at this juncture to have a person of capacity at that place, and one who understands the language; agreed that Mr. George Gray, junior, be appointed Resident at Cuttack, and that Mr. Bristow be recalled." He protested against his supersession, but without effect. On 1st February 1759 is recorded the receipt of a letter from Mr. John Bristow, dated the 6th January, representing that the Rajah owes him a month's pay for fifteen soldiers and sixty sepoys, and that he had to pay them himself Rs. 1,688, further informing us that though he joined the Rajah by our approbation, and commanded a party of Europeans and Topasses in the action by order of Colonel Forde, he was deprived of any share of the prize money, but that on account of his behaviour he was granted a present equal to a subaltern's share, *viz.*, Rs. 448, and requesting to be again appointed Resident at Cuttack. He died in Calcutta on 2nd December 1761.

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[1] Appointment of Mr. John Bristow, a surgeon by profession, as the Company's Resident at Cuttack.

George Alexander, Surgeon at Dakka, resigned his appointment from 11th October 1753, and was appointed surgeon of the *Montford*, in place of Joseph Lemon, deceased, on 20th December 1753, going home in that vessel.

Nathaniel Wilson, Surgeon's mate, was appointed to be Surgeon at Dakka, *vice* Alexander resigned, on 11th October 1753. He was still at Dakka in 1756, when the English factory there was taken by the Nawab's troops. The English residents were all taken prisoners, but set at liberty by the intercession of the French, and permitted to remain in the factory. From Dakka Wilson came to Fulta, where he served for some time as surgeon of Kilpatrick's force. He died either at Fulta, or in Calcutta immediately after the recapture, in January 1757, as the Public Proceedings of 28th February 1757 record the payment of a bill to his executors.

Putham, William, Surgeon, is mentioned in the General Journal of September 1756. He may have been in Calcutta at the time of the siege in 1756. A Surgeon John Putham, possibly the same man, married Mrs. Esther Pomfret, widow, on 18th July 1751.

William Ingles, or Engles, was appointed to be Surgeon's mate on 12th November 1753. On 20th February 1754, he was appointed Surgeon of the *Falmouth*, and went home in that ship. A letter from Court, dated 31st January 1755, states that he was permitted to return to India. He was reappointed to the Hospital in Calcutta, in Public Proceedings of 29th September 1755; and was killed in the siege of Calcutta in June 1756.

Owen Jones, Surgeon's mate, was permitted to return to England on 4th January 1754.

John Taylor was appointed Surgeon's mate in place of Owen Jones on 4th January 1754. He is the first medical officer of those here mentioned whose name comes into the list of the Bengal Medical Service, established on 1st January 1764, as he was certainly still serving in 1769-70, when his name appears as one of the Medical Officers who received a share of the profits of the Private Trade Association. His name, however, is not in Dodwell and Miles' list of the service. He was present in Calcutta during the siege in June 1756, but was taken prisoner before the final surrender, and so escaped the Black Hole. He escaped, and joined the other refugees at Fulta.

Henry Andrewes appears as Surgeon to the party serving at the Negrais, an island off the Burma Coast, on 30th January 1754.

John Knox was appointed to be an Assistant-Surgeon, in place of Ingles, gone home, on 11th March 1754. He was in Calcutta during the siege in June 1756, when it is mentioned that his house was burnt, but, like the other Medical Officers, was taken prisoner before the surrender;

escaped, and got to Fulta. Public Proceedings of 29th September 1755 note that he was permitted to remain at the hospital, in spite of Mr. Ingles' return. The same proceedings record on 25th March 1757, that he will be permitted to succeed to any vacancy that may happen. It is recorded that his wife and two children were among the refugees at Fulta. He died on 5th February 1758. Captain Mills' account of the capture of Calcutta says that *two* Dr. Knoxes escaped. Two Dr. Knoxes are also mentioned in the account of a sale of Madeira on 21st November 1757.

William Fullerton, the next name on our list, plays a more prominent part in history than any of his medical contemporaries, except Holwell. From 1754 to 1759 he appears as one of the two Surgeons to the Calcutta Hospital, the other being George Gray. He also was in Calcutta during the siege in June 1756, was taken prisoner, and escaped to Fulta. On 8th December 1757, he was appointed to be Mayor of Calcutta for the ensuing year. In 1759 or 1760 he was appointed Surgeon to the Patna Agency, and greatly distinguished himself in the war in Bihar.

Broome (History of the Bengal Army, pp. 281—283) thus describes the action on 9th February 1760 at Masimpur, near Patna, between the army of the Emperor Shah Alam, and the troops of Mir Kasim, Nawab of Bengal, commanded by Ram Narain, Governor of Patna, who was assisted by a few English troops. Only five officers were present, Captain Cochrane, commanding, Lieutenant Buck, of the Artillery, Ensign Windebeck, Volunteer Barwell, and Dr. Fullerton. The other four officers being all killed, "the only European officer now surviving was Dr. W. Fullerton, the Surgeon of the" [Patna]

" Agency, who assumed the command. Finding that the day was completely lost, this little party commenced their retreat to the city, surrounded by the enemy, but by the coolness and steadiness of their conduct keeping the latter at a respectful distance. One of the two gun carriages having broken down, they were compelled to spike the piece and leave it on the field, but the tumbril of the other having upset, Dr. Fullerton halted the party, deliberately righted it, and then resumed his march; by their cool and daring behaviour, this remnant of the party succeeded in making good their retreat to Patna."

The Emperor's troops then laid siege to Patna; Fullerton again distinguished himself in the defence. Broome writes (p. 297): "The arrangements of the siege on this occasion were very different from the former unscientific and dilatory proceedings, the ability and energy of M. Law being chiefly instrumental in occasioning this change; the city was invested on all three sides, and batteries were opened with considerable effect; after five days of open trenches Monsieur Law resolved upon an assault on the south side, but the breach not being perfectly practicable, he supplied his party with scaling ladders, and having destroyed the flanking defences covering the point to be attacked, he made the assault in broad day, and that in sosudden and unexpected a manner, that the party had gained the wall before the alarm was given. At the first intimation of this attempt, Dr. Fullerton, who had so greatly distinguished himself in the action of Musseempore, hastened with English *sipahis* to the spot, accompanied by several of the gentlemen of the factory, who volunteered their services as officers on the occasion; when they arrived, they found the ladders planted, and some of the French troops actually on the ramparts; a fortunate discharge of rockets, and the fire of the *sipahis*, quickly drove them back, and Rajah Shitab Roy making a judicious sally at the same moment from one of the neighbouring gates, took them in flank; and compelled them to retreat with considerable loss."

Fullerton, like the other officers and civilians then at Patna, was taken prisoner when the English factory was captured by Mir Kasim's troops in 1763, and was the only one of the prisoners who was not included in the "Patna massacre," carried out by the infamous Walter Reinhardt, *alias* Sombre or Somru, on the nights of the 5th or 6th and the 11th October 1763. In this massacre perished eighteen civilians, *viz.*, two members of Council, three senior servants, six factors, and seven writers; seven officers of Artillery, sixteen of Infantry, and four surgeons (Crooke, Hâm, Campbell and Anderson). A monument in Patna city commemorates their fate. The names of the military officers are engraved on the monument, also three Civilians, Hay, Lushington, and Ellis. A letter to the Court of Directors, dated 19th December 1763, gives the names of the Civil Officers who were killed. The two members of Council were Hay and Ellis; a third, Amyott, had previously been murdered near Monghyr. Two of the Surgeons, Crooke and Ham, are included in the list of Civilians; two, Campbell and Anderson, are among the officers named on the monument. Both Campbell and Anderson left diaries which are still in existence. The latter is continued up to the day of the massacre, the last entry being an anticipation of the murder of the prisoners. His journal runs from 23rd June to 6th October 176

Broome (p. 392) thus mentions Fullerton's escape: "Dr. Fullerton, whose medical abilities had made him many friends, and even gained the regard of Meer Kassim Khan, was the only person saved from destruction; he was permitted to reside in the Dutch factory, from whence he shortly afterwards made his escape, and joined Major Adams' force as they approached Patna."

Broome also gives in full in Appendix T. pp. 41, 42, Fullerton's account of the massacre, at which of course he was not present, but only described what he had heard from his captors. He also quotes the account of the massacre from the *Siar-al-Mutakherin*, which winds up as follows:—"Of all the prisoners, not a man remained alive, save Dr. Fullerton, who, by assisting professionally most of the grandees of the Court, had endeared himself to them; he even had Mir Kasim himself for an acquaintance and friend."

Fullerton resigned the Company's service between the date of the massacre and the end of the year, so just misses coming into the Bengal Medical Service, which was formerly constituted on 1st January 1764.

William Forth was Surgeon at Kasimbazar when the factory there surrendered to Siraj-al-daulat in 1756. He was sent by the Chief, Mr. Watts, to ask for terms, and then a second time went to the Nawab along with Mr. Watts. He escaped to Hughli. The consultations of 31st August 1756, on board the schooner *Phœnix*, at Fulta, contain the following order:—"Agreed that Mr. William Forth be appointed also to procure intelligence among the Dutch and French, and to submit the same by every opportunity, and that Mr. Warren Hastings at Cossimbazar be directed to remain there in order to observe their motions at Muxadavad." The consultations of 14th February 1757 note payment of Dr. William Forth's bill for sundry disbursements at Hughli. He asked leave to return to England on 20th December 1859, and left the service.

Archibald Keir's career forms a good instance of how, in the eighteenth century in India, "one man in his time plays many parts." He was Surgeon of the *Dalaware* East Indiaman, and accompanied Major Kilpatrick's force from Madras to Fulta, after the capture of Calcutta in 1756. While at Fulta, he also acted as Secretary to the Council. When the *Dalaware* was ordered home, he accepted a commission as Lieutenant, and was shortly afterwards appointed Quarter-Master to the Force. In 1758 he had risen to the rank of Captain, and was one of eight Captains who resigned their commissions because they were superseded by a Bombay Officer, Captain Govin. When he left the army he went home, but afterwards returned to India as a free merchant, settled at Patna, and engaged in heavy transactions in salt, the manufacture of which he greatly improved. At the time of the officers' mutiny in 1766 he returned to the army as a Captain in Sir Robert Barker's brigade at Patna, but when matters were peaceably settled a few months later, he again resigned.

John Wilson appears as Surgeon at Vizagapatam on 26th December 1757, when he was paid a bill of 240 Arcot rupees for house-rent.

John Hutton, on 20th December 1757, receives payment of a bill for the usual head money paid to the Surgeons of the Europe ships for care of the military. On 5th March 1859 is paid *Mr. Macredie's* bill for medicine and attendance on the soldiers landed from the *Prince George*. On

24th May 1759, *Walter Maxwell,* Surgeon of the *Hardwick,* writes setting forth the justice of his demand for head money for the military and sepoys transported to Vizagapatam. The last certainly, the other two probably, were Surgeons of Indiamen.

Peter Smith.—On 1st February 1759, orders are given to the "Buxey" (pay-master) to pay the bill for medicines and attendance on 78 of the King's detachment, rendered by Mr. Smith, Surgeon of the *Warren.* The name is hardly an uncommon one. He may or may not have been the same as Peter Smith, who appears in November 1762 as Surgeon's mate to the troops at Patna, and examined for promotion. "Proceedings, 11th November 1762. Mr. Peter Smith, Surgeon's mate in the army, having arrived from Patna, ordered the Secretary to direct Mr. Clement Crooke to call to his assistance one or more of the Surgeons of the Europe ships and examine Mr. Smith on his knowledge of his profession. And after such examination they are to report to the Board whether they esteem him properly qualified to be promoted to be a Surgeon to the Army."[1] The powers that then were in Bengal appear to have anticipated Mr. Brodrick's committee; though no doubt the examination to which Peter Smith was subjected was less searching than those which the unfortunate officers of the R. A. M. C. will have to pass. Smith passed; a good omen.

Tyso Saul Hancock.—A letter from Madras, dated 28th June 1759, in the Public Proceedings of 28th July 1759, says that Mr. Hancock is permitted to remove from the Madras to the Bengal.

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[1] Long's Selections, No. 738, p. 369.

Presidency. He was appointed Assistant-Surgeon in Bengal on 31st July 1759. He was appointed Surgeon to Kasimbazar, *vice* William Forth, but apparently never joined there, as he went home on 29th December 1759. He returned to Calcutta as a merchant, and died there in 1775.

Assistant-Surgeon W. Tust Tetch is mentioned on 6th August 1759 as "entertained some time since."

Clement Crooke, mentioned above as examining Peter Smith in November 1762, must then have been some time in the service, as he is spoken of as Head Surgeon in Calcutta. In 1763 he was in Bihar, and was one of the party under Mr. Amyott who were taken prisoners near Monghyr on 21st June 1763, Amyott himself being killed. The prisoners were taken to Patna, and there all of them, including Crooke, perished in the Patna massacre.

Surgeon Ham, of Kasimbazar, and Drs. *Campbell* and *Anderson*, Surgeons with the Army, were also among the victims of the Patna massacre. An appendix to Anderson's journal, however, says that Mr. Ham died at Monghyr.

William Stuart appears as Surgeon at Kasimbazar in the proceedings of 10th May 1762.

We have seen that the pay of the Surgeons in Calcutta in the early part of the 17th century, in Hamilton's time, was £36 per annum. An entry in the Public Proceedings of 3rd October 1757[1] shows that it still remained the same then, as in the list of that date giving the half-yearly pay of the Company's servants. George Gray and William Fullerton are shewn as drawing Rs. 144 each, at £36 per annum. *O! si*

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[1] Long's Selections, No. 249, p. 101.

sic semper! Would that rupees were still worth half a crown each, eight to the pound! But Broome (p. 558), giving the monthly pay of the different ranks of the army, under various circumstances, in 1756, shows the lowest rate of an Assistant-Surgeon's pay at military duty as Rs. 62 per month. Probably Medical Officers in civil employ were expected to add largely to their nominal incomes, either by the practice of their profession or by trade. A remnant of this higher rate of pay in military than in civil employ is seen in the fact that to this day the pay of a civil surgeon is lower than that of an officer of the same rank with a regiment, by fifty rupees a month, the difference being usually made up to the former in other ways.

Pay per month in 1756, in Sonaut rupees.

	Surgeon.	*Asst. Surgeon.*
Pay in garrison, or at the Presidency ...	124	62
Half *batta* in Cantonment ...	93	62
Field *batta* within the Carrumnassa or in Cantonment beyond that river ...	186	124
Double *batta* in the field beyond the Carrumnassa ...	372	248

The Carrumnassa or Karamnasa is the river which divides Bihar, south of the Ganges, from the N.-W. P. The farther from Calcutta, the higher the pay—a contrast to the modern system of Presidency allowances.

The following notes refer to periods subsequent to 1st January 1764, when the Bengal Medical Service was founded, and so, strictly speaking, are foreign to our present subject, but may be found of interest.

A letter from Court, dated 9th May 1764, para. 15, gives the method of appointment of new Surgeons, who apparently went out at first on the chance of succeeding to a vacancy, as follows:—"We have permitted several persons to proceed this season to the East Indies to be entertained in the Company's service as Surgeons at any of our settlements where they may be wanted, if found deserving, next after such as have already been recommended. We now send you in the several packets lists of the names of such persons signed by our Secretary, and this method we shall practice in future, which you are to observe as a sufficient authentication.[1]"

Another letter from Court, dated 22nd February 1764, para. 119, mentions private practice, and distinctly states that persons not in the Company's service must pay the Surgeons for their medical attendance. This is the first definite and official mention of the right to private practice which I have come across. "You inform us you have appointed two additional Surgeons at Calcutta, to succeed to the office of Principal Surgeons when those we have already nominated shall have been provided for; that some further assistance is necessary on account of the increased number of persons in our service, Civil and Military, we cannot but admit; but with respect to the inhabitants, they most certainly ought to reward the Physicians who attend them at their own expense. We allow therefore of your said appointments on these conditions however that they are to be deemed assistants only, and that their allowances from the Company shall be proportionately less than the Principal Surgeons."[2]

In the same year Government, in Public Proceedings of 1st November 1764, increased the pay of Head Surgeons by Rs. 100 monthly. "Taking into consideration the great increase of expenses in Calcutta, arising particularly from the extravagance of the article of house rent, housekeeping, and servants' wages, and the inadequacy of the stipends of the Chaplains and Head Surgeons to defray these expenses, it is agreed to add to their allowances the sum of 100 current rupees a month to be paid by the Buxey as charges extraordinary.[1]

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[1] Long's Selections, No. 591 p. 282.

[2] *Ib.*, No. 718, p. 376.

A letter to Court, dated 30th September 1766, para. 31, states that, on the abolition of private trade of individuals, an exclusive company was formed, consisting of the first three classes of covenanted servants, with Field Officers, Chaplains and Head Surgeons. The profits made were divided half-yearly between these officers.[2] In 1769-70 nine medical officers received a share of these profits, varying in individual cases from Rs. 2,250, which was the sum paid to six of them, down to Rs. 1,031.

The medical services of the three Presidencies were founded on 1st January 1764, by an order, dated 20th October 1763, as described in my previous article. The Bengal Service at least was divided into two branches, military and civil, on 5th May 1766[3] as noted in the Proceedings of that date. "The Resident informed the Board that, at the recommendation of Lord Clive and General Carnac, the Select Committee had come to a resolution of proposing that the Surgeons should be formed into two separate corps, one for the Civil, the other for the Military Establishment, and by way of encouragement for Surgeons who can be depended on to remain in the Army, that the two Head Surgeons at the Camp should have the same indulgence in a share of the Salt Trade and privilege of the *Dustuck*,[1] as the other four Head Surgeons at this settlement." Men were, as the extract shows, transferable from one branch to the other, which after all is pretty much the same state of affairs as at present exists. And even then it seems that the Civil branch was preferred, to judge from the inducement of trade profits offered to the senior Surgeons in the Army, to induce men to remain permanently in military employ.

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[1] Long's Selections, No. 765, p. 385.

[2] Ib. No. 826, p. 128.

The Proceedings of the Council, dated 24th October 1788, lay down that the members of the service all belong to one list, and those in Civil employment must be considered as only lent to the Civil Department. The minutes are much too long to quote in full, but the first article runs as follows:—"*Rules and Regulations for the Medical Department of the Service.—Article 1st.*—Resolved and ordered that all Medical Gentlemen employed in the Company's service under this Presidency be continued in one General List,—that they have commissions granted to them, agreeable to their proper ranks as Army Surgeons,—and that, whenever employed in the Civil Line, they be considered for the time as lent only to that Department of the Service, and liable always to be recalled to their duty as military surgeons, under the restrictions and obligations of service which are annexed to their military commissions." The Governor-General, Lord Cornwallis, at the same time recorded a long minute on the subject, from which I quote the following extract: "The first article, which continues all Medical Gentlemen under this Presidency on one General List, is conformable to the established practice of the service, and becomes necessary, in order to render them eligible to succeed to the station of Head Surgeons of General Hospitals. Hitherto their appointments have been by warrant only, but as they should be liable at all times to be employed as Army Surgeons, I have proposed giving them commissions, as in His Majesty's Service, which, by attaching them specially to the Military Department of the service, renders it proper that they should be considered as lent only to the Civil Branch of it while employed therein, and imposes those obligations of service on them, which every person accepting a Military Commission is necessarily liable to."

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[1] *Dustuck* should be *dastak*, literally hand-clapping hence passport.

The Medical Board was established in 1786, and held its first meeting on 29th May 1786. James Ellis, Physician-General, was the first President of the Board, the other two members were Andrew Williams, Chief Surgeon, and John Fleming, Surgeon of the Hospital at head-quarters (Calcutta). Mr. Birch was appointed purveyor, and Edmund Bengough apothecary to the Board. On June 3rd, Thomas Gillies was appointed Secretary to the Board, whose duties at first appear to have been confined to supervising the Medical Establishments in Calcutta. It was only gradually that the Board developed into a body advising Government on all medical matters.[1] Gillies, were ~~was a~~ members of the service, Birch and Bengough ~~were~~ was not.

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[1] Gleanings from the early Records of the Bengal Medical Department, by T. H. Hendley, C.I.E. In Proceedings of Indian Medical Congress of 1894.

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NOTES ON RUPTURE OF THE SPLEEN.

BY

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Civil Surgeon, Hughly.

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RUPTURE of the spleen is an injury which not infrequently comes under the notice of the Civil Surgeon in India; not, as a rule, in the hospital during life; but after death in the subject of a judicial *post-mortem* examination. This injury is one of great importance from a medico-legal point of view. Although fatal in practically every case, it may be caused by a very trifling degree of violence, and without any visible external injury, especially when the spleen is enlarged or diseased, as it so frequently is in the fever-saturated population of Lower Bengal. The fact that the enlarged spleen is so easily ruptured is usually taken into account by the courts in imposing sentence, when an accused person is convicted of having caused death in this way.

I have always taken much interest in this injury, eleven cases of which came under my notice in my early experience as a Civil Surgeon. Since that time I have collected notes of as many cases of rupture of the spleen as I could. With this object I have searched the *post-mortem* report books of every district where I have had the opportunity of doing so, and extracted notes of all cases of rupture of the spleen. I have thus collected a series of over 300 cases from twelve different districts, as given in Table No. I. (The notes of two other districts, Saran and Chumparun, have unfortunately been lost.) In only thirteen of these 304 cases was the *post-mortem* examination made by myself. No less than eleven out of these thirteen cases occurred in my first Civil Station, Mymensingh, and one each in Monghyr and Hughli.

Cases in which the body had been run over by an engine or train, in which rupture of the spleen was only a minor incident among extensive general injuries, have not been included among these 304 cases of rupture of the spleen. The total number of *post-mortem* reports gone through was 9,876, showing a percentage of 3·08 cases of ruptured spleen.

I have known it to be seriously asserted, by an educated Bengali, that no such lesion as rupture of the spleen is known; that the ascription of death to rupture of the spleen is a mere fiction put forward in mitigation of sentence on behalf of a European accused of killing a native. Such an assertion could, of course, only be due to the most absolute ignorance of the subject. In not one of these 304 cases was a European charged with causing the death of the victim. In one case the deceased was a European, death in this case being due to a fall.

TABLE NO. I.

	Period of Record.		Size of Spleens.							Ruptured.	
	Number of years.	Dates.	Much Enlarged.	Enlarged.	Not Enlarged.	Decomposed.	Not stated.	Total.	Percentage Enlarged.*	Number.	Percentage.
Midnapur … … …	19 years.	1871-89	22	171	223	190	79	685	46·39	44	6·42
Dinajpur … … …	14 ,,	1875-88	13	302	217	90		622	59·21	26	4·19
Darjiling … … …	5 ,,	1883-87	1	…	29	…	…	30	3·33	…	……
Dakka … … … …	12 ,,†	1872-88	382		824	436	119	1,761	31·67	46	2·61
Purnea … … … …	14 ,,	1876-90	20	91	160	154	61	486	40·95	15	3·08
Backerganj … … …	17 ,,	1873-89	48	277	918	410	79	1,732	25·33	16	0·92
Mymensingh … … …	9 ,,†	1874-87	[No notes available.]					820	…	34	4·14
Bhagalpur … … …	5½ ,,	1882-86	6	19	54	39	7	125	31·64	3	2·40
Monghyr … … …	9 ,,	1889-97	7	37	154	55	7	260	22·22	11	4·23
Patna … … … …	19 ,,	1879-87	22	67	467	194	27	777	14·20	16	2·05
Alipore (24-Parganas) … …	15 ,,	1885 99	188	543	504	371	230	1,836	59·19	37	2·01
Hughli … … … …	20 ,,	1881-1900	58	251	147	78	208‡	742	67·76	56	7·54

* Excluding from the total those "decomposed" or "not stated."
† Broken periods.
‡ 162 in the six years, 1881-86.

All these 304 cases were medico-legal *post-mortem* on bodies sent in by the police, that the cause of death might be ascertained by an autopsy. In every case the examination was made for judicial, not for scientific, purposes. To this cause is due the very scanty information available in many, especially among the earlier cases, those of twenty to thirty years ago. The statement of the fact that "the spleen was extensively ruptured" may be sufficient for the court, it does not give much to go upon when discussing the site of rupture, or the relation of the spleen to other viscera. In many cases, especially in later years, the information given is full and complete.

The spleen, according to Gray, has two surfaces, one external and convex, the other internal and concave; two ends, the upper thick and rounded, the lower thin and pointed; and two margins, anterior and posterior, the former often being notched. Gray gives the normal size and weight of the adult (European) spleen as follows; length, about 5 inches; breadth, 3-4 inches: thickness, 1-1½ inches; weight about 7 oz. In natives of this country, whose size and weight is usually much less than those of Europeans, the weight and dimensions of the spleen should presumably be somewhat less than the above. But in many parts of Bengal a normal spleen is less common than one enlarged, and the *average* size and weight of the spleen in the adult native of Bengal would probably be greater than those quoted above.

The site of the injury is described in very different ways in these reports, but it is fairly obvious that the words "inferior," "under," "anterior," and "concave," used in relation to surface, all refer to the internal surface; while "external," "outer," "posterior," and "convex," all refer to the external surface. In a very greatly enlarged spleen the external surface may come to lie partly to the front, but even in these cases I think that the word "anterior" is used as applying to the internal surface. What position is intended in such descriptions as "outer end" (Dakka), "cardiac extremity" (Patna), and "front and left side" (Hughli), it is not easy to say with certainty.

Mortuaries in India are seldom provided with scales and weights for weighing viscera. Sometimes the *post-mortem* house has barely room on each side of the table, on which the body is placed, for the operator to stand. Nor, for judicial purposes, is there any necessity that the weights of the viscera should be recorded. In describing an enlarged spleen, I usually give its three dimensions in inches.

As regards the use of the term *enlarged*, when a spleen has been described in the *post-mortem* report as much enlarged, or enlarged, I have entered it in the tables as such. Otherwise, I have entered as "much enlarged" all cases in which the spleen is said to have been three times the normal size, or larger, those described as ten or more inches in length, and those weighing one pound or more.

Table No. I above brings out some facts which appeared to me singular, and were certainly unexpected. I was not prepared to find that the percentage of ruptured spleens in Backerganj would work out to less than half that of any of the other districts given in the table. Nor that the percentage of enlarged spleens in Midnapur, always a popular and pleasant district, would be found to be nearly double that of Backerganj, which is very much the reverse. (I have served in both myself.)

In calculating the percentage of enlarged spleens, I have omitted from the total all which have been described as decomposed, and all in which no reference to size has been made, merely putting the enlarged and the much enlarged on one side, the not enlarged on the other. The percentage of enlarged spleens may be taken as a rough test of the unhealthiness of any district, especially as regards malarial fever. Judged by this test, Hughli comes out an easy first, Dinajpur and the 24-Parganas being almost equal, second. This result is only in accordance with what I had expected. The chief surprise was to find Midnapur so high, Backerganj so low. Fourth on the list comes Midnapur; Purnea, a very malarious district, and a very unhealthy one for natives, though a pleasant and popular station for Europeans, comes fifth. Then, after a big drop, come Dakka and Bhagalpur, almost equal, followed by Backerganj, a little above Monghyr, and then Patna. I regret that I have not preserved the figures for Mymensingh, which I would expect to stand high in the table. Taking the cases in which the spleen was ruptured, 24 were enlarged, 10 not stated, while not a single one was described as normal or not enlarged. Calculated in the same way as the other districts, this would give a percentage of 100 as enlarged. Such a statement would, no doubt, be a considerable exaggeration, but certainly the percentage of enlarged spleens in Mymensingh must be considerable.

To give a description, or a detailed report, of over 300 cases of rupture of the spleen, would require a book, not a magazine article. I propose, therefore, to consider the cases *en bloc* under certain definite headings. As regards some of these headings, one paragraph and one table will suffice for the whole series; others will require consideration at greater length, district by district. A few of the cases will be described individually but briefly.

The following are the headings under which I propose to consider the cases; numbers 4, 5 and 8 being given district by district:—

1. Sex.
2. Age.
3. Cause
4. Site.
5. Single or multiple.
6. Size of spleen.
7. Contents of Stomach.
8. Complications, other injuries.
9. Time of year.
10. Period of survival.
11. Wounds of spleen.
12. Ruptures of liver.

I. Sex, and II. Age.—These may be combined in one table (No. II). In the whole series, males (147) and females (157) are almost equal. Females predominate in Dakka (nearly double), Midnapur, Mymensingh and Hughli; males in the 24-Parganas (nearly treble), Purnea and Backerganj.

Regarding age, nearly half the whole number were from 25 to 45, nearly two-thirds adults, from 15 to 45. Men of this age are most likely to be engaged in fights, or to receive accidental injuries at work; while adult females are the most likely to become involved in family jars. The youngest child in the list was a female child of 18 months, which was killed by a kick at Hughli. Two children of two years, both females, and a third of five, were killed at Patna by being run over, and a small boy of five at

Backerganj by a tree falling on him. The oldest was a man of 70, killed at Dakka by kicks and blows of the fist.

TABLE NO. II.—AGE AND SEX.

	Male	Female.	0—5	5—15	15—25	25—45	Over 45	Age not stated.	Total
Midnapur ...	16	28	...	5	7	21	6	5	44
Dinajpur ...	15	11	...	5	1	14	2	4	26
Dakka ...	16	30	...	7	10	18	9	2	46
Purnea ...	9	6	...	1	6	6	2	...	15
Backerganj ...	10	6	...	4	2	5	5	...	16
Mymensingh	14	20	...	6	6	15	7	...	34
Bhagalpur ...	3	...	...	1	...	2	...	...	3
Monghyr	6	5	...	1	2	6	2	...	11
Patna ...	8	8	2	2	2	7	3	...	16
24-Parganas ...	27	10	...	3	6	23	5	...	37
Hughli ...	23	33	1	4	11	27	11	2	56
Total ...	147	157	3	39	53	144	52	13	304

III. Cause.—The causes to which the fatal rupture was ascribed are given in Table No. III. The most common cause is beating with a *lathi*, or club, or other heavy blunt instrument, which accounts for 102, or just over one-third of the whole series. Blows with the fist, kicks, or slaps, or two or more of these causes combined, account for 62, a little over one-fifth; while in 57, or nearly one-fifth, the cause is given as unknown, or is not given at all, or is reported as due to some other cause, or is indefinite, such statements as "body found in a tank," "found dead," &c., being the only information given. Falls, usually from trees, in one case from a high bridge (24-Parganas), were the cause of death in 22 cases, including the one European; 17 were run over by carts or carriages; 23 are said to have been murdered.

TABLE NO. III.—CAUSE.

	Blows with *lathis*, &c.	Blows of fist, kicks, or slaps.	Pressure on body.	Murdered.	Falls.	Run over.	Heavy weight falling on body.	Miscellaneous.	Unknown, indefinite or not stated.	Total.
Midnapur	13	10	...	4	1	1	1	2	12	44
Dinajpur	9	3	...	1	...	4	1	5	3	26
Dakka	15	18	...	1	2	1	...	2	7	46
Purnea	6	...	...	...	2	...	...	...	7	15
Backerganj	3	...	2	2	2	...	1	...	6	16
Mymensingh	17	5	..	2	1	2	...	2	5	34
Bhagulpur	...	...	...	...	...	...	...	...	3	3
Monghyr	3	4	...	2	1	...	...	...	1	11
Patna	7	1	...	2	...	6	...	...	...	16
24-Parganas	11	3	...	5	8	3	...	1	6	37
Hughli	18	18	...	4	5	...	...	4	7	56
Total ...	102	62	2	23	22	17	3	16	57	304

Pressure on the body is given as the cause of only two deaths out of the whole series of 304 cases, both in Backerganj. I was surprised to find so few cases ascribed to this cause, as it is well known in many parts that severe internal injuries may be caused in this way with little or no external marks of injury. The drawback to this form of murder is that it requires the participation of several hands. It is carried out in two ways; either one man jumps on the prostrate body of the victim, or pounds the body all over with knees, elbows, and heels, while several others hold him down; or else two men place a bamboo across the body at a right angle, and then, one sitting on each end of the bamboo, seesaw it all up and down the body, from neck to groin. This second method also requires the co-operation of others holding down the victim.

Falls account for twenty cases, of which eight, over one-third, were in the 24-Parganas. The falls were mostly from high trees, especially coconut trees.

Run over.—This heading includes seventeen deaths. As stated above, I have omitted cases in which the body was run over by an engine or train. Of such cases there were sixteen in the 24-Parganas. Patna seems to be specially prone to furious driving. Two of the deaths there were caused by tramcars passing over the body, which, after all, is almost as certain a cause of death as an engine. There is little hope of survival in cases also in which a heavily loaded bullock cart passes over the body; while, as I know from personal experience, a light dogcart may cross a man's body and leave him none the worse.

Backerganj shows no deaths caused by being run over. Almost all traffic there is carried on by boat; in my time, thirteen years ago, there were no bullock carts or *tikka garis* at Barisal, and very few private carriages or dogcarts.

In the three cases in which rupture of spleen was caused by a heavy weight falling on the body, the agent was a bag of salt in the first case (Midnapur); a heavy branch in the second (Dinajpur); and a tree in the third (Backerganj).

The sixteen cases returned as due to miscellaneous causes show a considerable variety. Midnapur shows two such cases; in one death was caused by a clod of earth thrown, striking the left side of the body, in the other by an elephant. Dinajpur shows the largest number of deaths under this heading, five; a blow with a shoe; a blow with a wooden stool; a prod from a cow's horn; injuries inflicted in the attempt to effect sexual intercourse, the victim being a female child of 12, and accidental injuries caused in a game, "*dadhikada*," in which one man tries to take away by force a cocoanut which another man holds against his chest. Two cases at Dakka were caused by a blow with a *puta* or grinding stone, and by the kick of a horse. Two at Mymensingh, one by being knocked down by a horse, the other by a stab. One in the 24-Parganas was due to being knocked down (not run over) by an engine; two of the four deaths at Hughli were also thus caused; the other two at Hughli were due to a blow from the shaft of a stationary engine in a jute mill, and a blow on the left side from a ball thrown in play during a game.

The Mymensingh case due to a stab is one of the few which I give in detail, as an instance of how trivial a blow may cause death from rupture of the spleen. The *post-mortem* examination in this case was made by myself: "Nabu Sheikh, Mussalman, male, 40, of Diwanganj, 14th November 1886, said to have been killed by a stab. A small wound, ¾ inch long, gaping ½ inch wide, over eighth left rib, about five inches above and external to the umbilicus. From its outer end a slight scratch runs upwards and outwards for three inches. This wound was quite superficial, ⅛th inch deep, *penetrating only into and not through the subcutaneous cellular tissue.* Peritoneum healthy, contained about half a pint of dark fluid blood round spleen. Stomach healthy, empty. Liver enlarged and congested. Spleen enlarged, about twice normal size; a rupture, three inches long, crossing outer side half-way between upper and lower ends. Death was due to rupture of the spleen, probably caused by the blow, trifling in itself, which inflicted the wound over eighth rib."

The one case in which the victim was a European occurred in the 24-Parganas in 1898. Deceased was a male, 38 years old. He was suffering from diarrhœa and bronchitis, he slipped and fell in his bath-room, complained of difficulty of breathing, and died in a few minutes. The lower lobes of both lungs were congested. Peritoneum contained 5℔. fluid blood, and several large clots, stomach congested, contained 1dr. greenish liquid. Spleen weighed 1℔. 3 oz. and measured seven inches long, five broad, two thick; there were four lines of rupture on the internal surface. Probably in falling deceased came down with his left side on the small wall which usually divides a bath-room.

In two cases a well-marked ligature mark round the neck, with other signs of hanging, were found in conjunction with rupture of the spleen. In one case, at Mymensingh, the rupture was small, and the reporter suggests that it may have been caused in taking down the body, after death. In the second case, from the 24-Parganas, the peritoneum contained 1½℔. dark fluid and clotted blood, the spleen was much enlarged, five times the normal size, with a rupture 5 inches long, 1¼ deep, crossing its internal surface.

The *post-mortem* report states that the rupture of the spleen would have caused death, but that the body was probably hung up before death to divert suspicion, and that death was actually due to hanging.

IV. Site
V. Single or multiple. } These headings are considered below at greater length district by district. The following table (No. IV) gives the cases for each district under these heads. A rupture on both surfaces does not necessarily mean multiple ruptures, as in many cases one long rupture involved both surfaces, crossing either the anterier or posterior margin.

TABLE NO. IV.—SITE OF RUPTURE.

	Inner surface.	Outer surface.	Both surfaces.	Miscellaneous.	Site not stated	Total.	Single.	Multiple.
Midnapur	22	5	1	9	7	44	38	6
Dinajpur	8	13	...	2	3	26	18	8
Dakka	18	5	2	14	7	46	28	12
Purnea	9	3	...	1	2	15	10	5
Backerganj	4	4	1	1	6	16	13	3
Mymensingh	14	8	3	5	4	34	30	4
Bhagalpur	1	...	2	...	...	3	1	2
Monghyr	4	3	2	1	1	11	11	...
Patna	4	2	1	6	3	16	10	6
24 Parganas	23	3	7	4	...	37	18	19
Hughli	26	9	5	7	9	56	42	14
Total ...	133	55	24	50	42	304	225	79

It will be noticed that the inner surface is by far the most common site for rupture, the lesion being on this surface in just over one-half of the cases, if we omit those in which the site is not stated.

Nearly three-fourths of the ruptures are single. In the 24-Parganas the multiple ruptures are actually in a majority, while in Bhagalpur they are two to one, but the number of cases in that district, three, is so small that they need hardly be taken into consideration.

VI. *Size of Spleen.*

The following table gives this information for the whole series of 304 cases :

TABLE NO. V.—SIZE OF SPLEENS.

	Much Enlarged.	Enlarged.	Not enlarged.	Not stated.	Total.
Midnapur	15	21	2	6	44
Dinajpur	7	12	1	6	26
Dakka	20	14	...	12	46
Purnea	2	13	...	...	15
Backerganj	4	7	1	4	16
Mymensingh	11	13	...	10	34
Bhagalpur	2	1	...	...	3
Monghyr	2	8	...	1	11
Patna	1	5	2	8	16
24-Parganas	27	4	2	4	37
Hughli	16	27	...	13	56
Total	107	125	8	64	304

It will be seen that in only eight, out of the whole series of 304 cases, is the spleen stated to have been of normal size. A few short notes are given of these eight cases in which spleens of normal size were ruptured by external violence. MIDNAPUR, two cases, in the first, a woman of 16, was said to have been murdered, the stomach contained a meal of undigested rice and vegetables, the spleen was not enlarged, there was a rupture 1½ inches long, hlaf an inch deep, on its inner surface. In the second case, a girl of 15 was killed by blows with the handle of a *khanta* (shovel); the stomach was empty, the spleen was not enlarged, there was a large irregular laceration of the "back part" (posterior surface?). DINAJPUR, one case, a man of 37, killed by beating with *lathies*. The stomach was full, the spleen of normal size, it had a laceration in convex surface, ¾ inch long by ¼ inch broad. BACKERGANJ, one case, a male of 50, cause not stated, spleen not enlarged, very soft, ruptured (site of rupture not stated). PATNA, two cases. First, a man of 50, said to have been killed by a blow with a *garasa*, or battleaxe; he had a wound on the left thigh severing the femur, and almost cutting off the leg, another wound on the back of the left leg, the 11th left rib was fractured, the spleen normal in size, there were two ruptures, one superficial three inches long, on outer surface, the other at lower extremity, 1½ inches long, ½ inch deep. Second, a man of 25, killed by *lathi* blows; there were bruises all over the body, the 8th to 10th right ribs were fractured, the stomach healthy, full of half digested vegetable food; the spleen normal in size, a rupture two inches long, ¼ inch deep, in middle of outer surface. TWENTY-FOUR PARGANAS, two cases. First, a male of 65, killed by a carriage running over him; the 2nd to 4th right and 2nd to 7th left ribs were fractured; stomach contained 24 oz. sweetmeats and dark clotted blood, it was lacerated for 1½ inches along greater curvature;

the liver weighed 1 lb. 9 oz., there were six transverse ruptures from one to three inches long, and from ½ to ⅙ inch deep on its superior surface ; the spleen was healthy, weighed 2 oz. ; there was a transverse rupture, two inches long, half an inch deep. Second, an old woman of 60, said to have been killed by dacoits ; the stomach was distended with an undigested meal of rice and vegetables, the liver weighed 2 lb. 12 oz., there was a transverse rupture, 1½ inches long, on under surface of posterior border of right lobe ; the spleen was not enlarged, weighed 4 oz. ; there was a rupture 2½ inches long, ¼ inch wide, half inch deep, on inner surface, running transversely across hilum.

It is worthy of note that in five out of the eight cases in which a healthy spleen was ruptured, the stomach is said to have been full, while in only one case is it said to have been empty.

VII. Contents of Stomach.—With reference to the seat of rupture, I worked out these facts carefully, to see whether they would give any ground to support the theory that when the stomach is full, the spleen would be most likely to be ruptured on its inner surface. I do not think that the facts ascertained are of any great importance. It is true that the cases in which the stomach was full, or contained some food, and the spleen ruptured on its inner surface, came to 83, or more than one-fourth of the whole series of cases; and that the proportion of ruptures of the inner to those of the outer surface of the spleen is greater when the stomach contained food than when it was empty. But the disproportion is not sufficiently large to be a safe foundation for an argument. In particular, both the actual number of spleens ruptured on the inner surface, and their proportion to those ruptured on the outer surface or elsewhere, is larger in the cases in which the stomach contained some food than in those in which it was full. If the theory were true, one would naturally expect that the fuller the stomach, the more prone it would be to rupture on the inner side.

TABLE NO. VI.—CONTENTS OF STOMACH.

	Midnapur.	Dinajpur.	Dakka.	Purnea.	Backerganj.	Mymensingh.	Bhagalpur.	Monghyr.	Patna.	24-Parganas.	Hughli.	Total.
Stomach full.												
Inner surface	5	7	7	3	...	5	1	..	...	5	5	38
Outer ,, ...	..	9	...	1	..	4	...	...	1	1	...	16
Both ,, ...	...	...	2	...		...	...	...	...	1	..	3
Miscellaneous	1	1	1	...	...	...	...	...	1	2	1	7
Site not stated	1	...	...	1	...	...	...	...	...	...	1	3
Stomach contained some food.												
Inner surface	10	.	7	...	2	2	1	2	2	10	9	45
Outer ,, ...	1	...	.	...	3	2	...	...	1	1	3	11
Both ,, ...	1	..	1	...	1	...	1	...	1	2	1	8
Miscellaneous	4	..	5	...	...	3	...	1	2	1	4	20
Site not stated	...	...	2	1	1	...	...	...	2	...	4	10
Stomach contained a little food.												
Inner surface	1	..	.	...	1	2	...	...	...	4	3	11
Outer ,, ...	...	1	...	1	...	...	...	...	...	...	1	3
Both ,, ...	...	...	.	...	...	...	..	1	...	1	1	3
Miscellaneous	1	..	..	...	1	1	...	...	...	...	1	4
Site not stated	..	...	2	...	2	1	...	1	...	...	..	6
Stomach empty.												
Inner surface	1	1	...	...	1	3	...	2	1	4	7	20
Outer ,, ...	2	1	5	...	1	1	..	1	...	...	2	13
Both ,, ...	...	...	...	..	...	2	...	1	...	3	1	7
Miscellaneous	2	...	5	1	...	1	..	...	3	1	1	14
Site not stated	...	...	1	1	...	...	...	..	1	...	2	5
Contents of stomach not mentioned.	14	6	8	7	2	7	...	2	1	1	9	57
Total ...	44	26	46	15	16	34	3	11	16	37	56	304

I have included all cases in which the stomach was said to contain one pound of food or over as "full;" from four ounces to a pound as "some food," under four ounces as a "little food."

The only individual case which requires mention under this heading is one in which the stomach itself was ruptured; this case has been described in detail under head VI, size of spleen.

"Miscellaneous" in the tables includes all cases in which the rupture cannot be brought under the head of either inner, outer or both surfaces.

VIII. Complications.—Under this head I propose to describe briefly the other injuries suffered at the same time as rupture of the spleen, giving the cause of death (if stated) in each case. This may most conveniently be done district by district. But a short summary of the various complications may first be given. In thirty-two cases some other organ suffered rupture as well as the spleen, *i.e.*, in rather over ten per cent. of the whole; in nineteen of these thirty-two cases, or in over six per cent. of the whole series of 304 cases, the liver was ruptured.

Liver ruptured	15 cases.
Liver, lungs and heart ...	1 case.
Liver, lungs and right kidney ...	1 ,,
Liver and right kidney	1 ,,
Liver and stomach	1 ,,
Left kidney	5 cases.
Heart	3 ,,
Intestine (duodenum one, ileum one)	2 ,,
Peritoneum	1 case.
Omentum	2 cases.

A.—Midnapur.

(*a*) Rupture of outer surface of left kidney (beating).

(*b*) Fracture of six left ribs (three in two places), left humerus, scapula, and clavicle, and 7th dorsal vertebra (murdered).

(*c*) Fracture of 9th to 11th left ribs (cause not stated).

(*d*) Fracture of two ribs on right and one on left side, with rupture of right internal mammary artery (killed by elephant).

(*e*) Fracture of 4th left rib (killed by violence).

(*f*) Extravasation in lungs (blow with mallet).

(*g*) Fracture of 6th and 7th left ribs (run over by cart).

B.—Dinajpur.

(*a*) Liver torn to pulp (run over by cart).

(*b*) Peritoneum torn in lumbar region on both sides (kicks).

(*c*) Cut throat and rupture of gastro-splenic omentum (blow with stool).

(*d*) Fracture of 10th and 11th left ribs (beating).

C.—Dakka.

(*a*) Fracture of skull (beating).

(*b*) Fracture of 5th and 6th left ribs (kicks and blows).

(*c*) Fracture of 5th, 6th and 7th left ribs (kicks and blows).

(*d*) Fracture of 5th to 7th right, 6th to 10th left ribs, and pleura torn (found dead).

(*e*) Fracture of 2nd to 12th right, 7th and 8th left ribs, and both pleuræ torn (tied up and beaten to death).

(*f*) Fracture of 6th to 8th right, 9th and 10th left ribs (kicks and blows).

(*g*) Fracture of left clavicle (run over by carriage).

(*h*) Fracture of skull (beating with *lathi*).

(*i*) Fracture of nasal bones, seven right and nine left ribs, lungs and heart torn by broken ends of rib, rupture of liver (ascribed to blows with fist and with a *huqqa*); probably due to blows with a blunt weapon.

(*j*) Punctured wound on left side of abdomen, penetrating peritoneal cavity, but not touching any of viscera (stab).

D.—Purnea.

(*a*) Fracture of left temporal bone (beating).

(*b*) A laceration of rectum, above sphincter ani, two inches long, penetrating into peritoneal cavity (beating, and pushing a stick up anus).

E.—Buckerganj.

(*a*) Rupture of liver, to right of lobus spigelii (a tree falling on the deceased).

(*b*) Rupture of liver, in three places, two on under and one on posterior surface of right lobe (pressure on body).

(*c*) Fracture of 10th left rib, and tear of peritoneum (fall from tree).

(*d*) Rupture of duodenum, in lower end, two inches long (cause not stated).

(*e*) Two lacerated wounds on head (murdered).

(*f*) Fracture of sternum (pressure on body).

F.—Mymensingh.

(*a*) Detachment of costal cartilages from left ribs, from 5th to 10th (cause not stated).

(*b*) Rupture of left kidney, contused into pulp; nymphæ and perineum contused (beating).

(*c*) Fracture of 2nd to 12th right, 3rd to 7th and 10th to 12th left ribs, lungs and pleuræ lacerated by broken ribs, left hand cut off at wrist (wounds).

(*d*) Rupture of ileum, ½ inch long, on anterior aspect about middle (beating).

(*e*) Mesentery full of small blood clots from ruptured vessels (run over by cart).

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(*f*) Fracture of sternum, rupture of aorta and heart (run over by cart).

(*g*) Rupture of liver, small obtuse angled, ¾ inch long, on lower surface of left lobe (beating).

(*h*) Fracture of 9th left rib (beating).

G.—Bhagalpur. Nil.

H.—Monghyr. Nil.

I.—Patna.

(*a*) Fracture of cartilages of fourth to sixth left ribs, rupture of liver, superficial, half inch long, a quarter inch broad, on convex surface of right lobe (kicks and blows).

(*b*) Fracture of eighth to tenth left ribs, extensive rupture of liver (run over by cart).

(*c*) Three fractures of skull, fracture of third to tenth left ribs (*lathi* blows).

(*d*) Left femur severed by a battleaxe (murdered).

(*e*) Fracture of twelve left and six right ribs, sternum, left clavicle, and fifth cervical vertebra; spinal cord, and œsophagus divided, pleuræ lacerated (run over by tramcar).

(*f*) Fracture of eighth and ninth left ribs (*lathi* blows).

(*g*) Fracture of eighth to tenth right ribs (*lathi* blows).

(*h*) Fracture of sixth to ninth right ribs, sacrum, innominate bone; rupture of liver, both lungs, and right kidney (run over by tramcar).

(*i*) Fracture of seventh to tenth right ribs, rupture of liver, extensively on upper surface (run over by cart).

(*j*) Fracture of second to fifth right ribs, fourth to tenth left ribs, rupture of pericardium and left auricle of heart (run over by carriage).

(*k*) Fracture of tenth left rib (*lathi* blows).

J.—Twenty-four Parganas.

(*a*) Rupture of liver, right lobe lacerated to pulp (fall from a tree).

(*b*) Rupture of capsule of liver in two places, each 3½ inches long across upper surface of left lobe (fall from a tree).

(*c*) Fracture of skull (fall from a high bridge.)

(*d*) Rupture of liver, extensively in many places (fall from a tree).

(*e*) Fracture of ninth to tenth left ribs, rupture of left kidney at pelvis (*lathi* blows).

(*f*) Ligature mark round neck, with parchment mark on dissection, and impression of knot (probably killed by blows, and afterwards body—a girl of 12—hung up to divert suspicion).

(*g*) Rupture of omentum (fall from a tree).

(*h*) Wounds on head, bruises all over body (*lathi* blows).

(*i*) Incised wounds on head (killed with a *dhao*).

(*j*) Fracture of skull (*lathi* blows).

(*k*) Rupture of liver in two places, both on under surface, one 2½ inches long, ¼ inch broad, extending inwards from right border of right lobe, the second ¼ inch long, ⅙ inch deep, commencing from left border of right lobe; rupture of right kidney, 1 inch long, ¼ inch deep, transversely across hilum (body found dead).

(*l*) Fracture of second to fourth right, second to seventh left ribs; rupture of stomach for 1½ inches along lower curvature, rupture of liver transversely in six places on superior surfaces, each rupture 1 to 3 inches long, ½ to ⅙ inch deep (run over by carriage).

(*m*) Fracture eighth to eleventh left ribs, fracture of skull, rupture of left kidney, half an inch long (*lathi* blows).

(*n*) Rupture of left kidney on posterior surface, ½ inch long, ¼ inch broad, ¼ inch deep (*lathi* blows).

(*o*) Rupture of liver, transverse, 1½ inch long, on under surface of posterior border of right lobe (killed by dacoits).

K.—Hugli.

(*a*) Rupture of liver in several places (blows and kicks).

(*b*) Rupture of liver (body found in a tank).

(*c*) Rupture of liver, in left lobe, extending from anterior margin upwards for 1½ inches, almost completely dividing substance of organ (kicks and blows, a child).

(*d*) Rupture of left kidney near hilum (a blow with a piece of wood).

(*e*) Rupture of heart, ¾ inch long, ¼ inch broad, at base of left ventricle, pericardium contained ℥iv blood (murdered, body found floating in a tank, with hands tied behind back).

(*f*) Fractures of left leg, skull, fourth to seventh right ribs, laceration of right lung, rupture of liver, which was lacerated in several places on upper surface (knocked down, not run over, by engine).

Under this heading I will relate in full one case of multiple injuries, including rupture of the spleen, in which the *post-mortem* examination was made by myself. Ramjai Chang, Hindu male, fifty, of Mymensing *thana*, said to have been killed by a cart passing over him, 26th January 1887. There were scars of an old burn on the front of the upper part of the chest and the right shoulder, the left arm had been amputated at the middle at some former time. The sternum was fractured, completely broken in two, immediately below its junction with the fifth costal cartilages. The heart was lying loose in the pericardium, completely torn away from the great vessels. The aorta was completely ruptured across, three-quarters of an inch above its origin. The pulmonary veins were torn away from the left auricle, making a gap in the auricle, two inches long by half an inch broad. The right auricle was similarly ruptured, being torn away from both venæ cavæ, the whole outer wall of the auricle was torn out. The pulmonary artery had been torn away from the right ventricle, leaving a large gap in its upper end. The peritoneum was healthy, it contained about a pint of dark fluid blood round the spleen. Stomach healthy, contained one ounce of grey muddy fluid. Omentum full of small clots of effused blood, due to small ruptured vessels. Liver healthy, uninjured. Spleen half as large again as normal, there were two ruptures. The first commenced on the internal surface, 1 inch above the lower end, and extended round the lower end into the external surface, where it almost joined the second rupture, a bridge of spleen capsule, one line broad, separating the two ruptures. The first was 1½ inches long, the second was 2½ inches long, and extended from the end of the first, in a semi-circular manner, round the anterior edge of the spleen into the internal surface again, where it ended close to the hilus. Death was due to the injuries received, probably caused by the passage over the body of a heavy cart.

IX. Time of year.—The following table, No. VII, gives the time of year at which the cases of rupture occurred. I do not think it proves much. The largest number were in December and January, the smallest in June, which is in accordance with what one would expect, but the differences are not striking.

TABLE NO. VII.—TIME OF YEAR.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Not stated.	Total.
Midnapur	4	3	5	3	3	4	4	1	1	4	7	5	...	44
Dinajpur	5	1	1	2	...	3	2	4	1	3	1	3	...	26
Dakka	7	7	6	4	8	1	1	1	3	1	4	2	1	46
Purnea	3	1	2	...	...	1	1	...	2	...	2	3	...	15
Backerganj	2		...	1	3	...	2	...	1	1	3	2	...	16
Mymensingh	4	...	4	2	5	1	...	5	6	2	3	2	...	34
Bhagalpur	1	...	...	...	...	...	...	...	1	...	...	1	...	3
Monghyr	1	...	2	...	1	...	2	...	...	1	1	3	...	11
Patna	...	1	1	2	1	1	1	2	...	1	3	3	...	16
24-Parganas	1	1	5	2	6	1	1	3	3	3	3	8	...	37
Hughli	6	5	5	2	5	1	6	5	5	10	2	4	...	56
Total ...	34	20	31	18	32	13	20	21	23	26	29	36	1	304

X. *Period of Survival.*—The questions of how long a man may survive rupture of the spleen, and whether he may possibly recover from such an injury, are of much interest. They are, unfortunately, questions upon which this large series of cases throws next to no light. In only three out of the whole 304 cases is the point even mentioned.

The information furnished by the police is usually very defective, often necessarily so. The sub-inspector or head constable who enquires into a case of unnatural death, often at a place at a considerable distance from his head-quarters, is entirely dependent upon the statements made by ignorant villagers, who at best are inaccurate, who know nothing of the value of time, or of the importance of getting exact information as to the time of the injury and of death, and who may have very good reason to make statements deliberately misleading. The officer who conducts the enquiry can only give the information he gets. Frequently the time of death is not even mentioned in the reports sent in, much less the interval between the injury and the fatal result.

Lieutenant-Colonel E. G. Russell, I.M.S., in his work on Injuries of the Spleen* (pp. 217—221), gives two cases in which recovery apparently took place after rupture or bruise of the spleen; the diagnosis, in one case, being confirmed by dissection of the victim, who died several years afterwards. He also quotes four cases in which the victim survived the injury for over twenty-four hours; in one case five, in two four, and in one two-and-a-half days.

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* "Malaria, its causes and effects; malaria and the spleen, injuries of the spleen, an analysis of 39 cases." By E. G. Russell, M.B., B.Sc., London, Surgeon, Bengal Medical Service, Civil Surgeon, Kamrup, Assam. Calcutta, Thacker, Spink & Co., 1880.

The three cases in this series which bear on this point are as follows:—

(i). Dakka, Hindu male, thirty-one, said to have been beaten on 2nd January 1888, and to have died "a few days later." *Post-mortem* on 7th January 1888. Peritoneum contained a pint of fluid effused blood; large omentum bruised; small gut bruised in many places; stomach empty; spleen much enlarged, ruptured at upper part of external surface.

(ii). Mymensingh, Mussalman male, ten, said to have died three days after being knocked down. No external marks of injury. Peritoneum healthy; stomach healthy, contained a little muddy fluid; spleen slightly enlarged, a small rupture $\frac{3}{4}$ inch long at lower end of anterior border, ℥ii—℥iii of blood effused around the rupture. (In this case, the *post-mortem* examination was made by myself on 11th April 1886.)

(iii). Twenty-four Parganas, Mussalman male, fifteen, said to have been beaten with *lathis* on 20th July 1897, was admitted to the Campbell Hospital on the same day, and died there on the 6th of August; *post-mortem* on 7th August. There was an oblique longitudinal mark, five inches long, across the left side of the back, with fracture of four ribs, the 8th to 11th left ribs. The left temporal and parietal bones, and the left wing of the sphenoid bone were fractured, the meninges of the brain were inflamed, and covered with lymph, containing much serum. The left pleura was adherent; peritoneum full of dark blood; stomach healthy, contained some mucus; liver pale, waxy, bloodless; spleen much enlarged, weight 1 lb., a rupture,

¾ inch long, on inner aspect; left kidney weighed 6 oz., a rupture in it. ¼ inch long (site of rupture not stated).

There can be no doubt about the facts of this case, as the boy was in hospital from the day of the injury till his death. He had undergone fracture of three of the bones of the skull, four ribs, and rupture of two viscera. Yet he survived for no less than seventeen days; and, in the end, the immediate cause of his death appears to have been inflammation of the meninges of the brain. If the rupture of the spleen had been the only injury, surely he might have recovered.

XI. Wounds of Spleen.—In the whole number of 9,876 *post-mortem* examinations, only six cases of wound of the spleen are recorded, or 0·06 per cent. as compared to 304 cases of rupture without external wound, or one case of wound to every fifty cases of rupture. Being so few in number, these six cases are briefly described below, with a seventh, in which a wound was said to have been inflicted after death.

(*i*). Dinajpur, 19th April 1883; Mussalman male, 30, said to have been murdered with a knife. There were four wounds, three of which were trivial (description omitted here). The fourth was a wound, 2½ inches long, one inch broad, fusiform, passing between 9th and 10th left ribs near their junction with their costal cartilages, piercing the diaphragm, gastro-splenic omentum, spleen, and part of greater omentum, completely dividing the lower part of the duodenum, and striking left side of spine. Left pleura contained a pint of dark fluid blood and some clot, abdominal cavity contained some fæcal matter, 2½ pints dark fluid blood, and 10 oz. clot over liver and omentum; stomach full; spleen pierced through middle.

(*ii*). Dakka, 2nd January 1872; Mussalman male, age not noted, said to have been killed with a needle. Marks of puncture in left hypochondrium. Abdominal cavity contained a great quantity of fluid blood, and a clot weighing 1 lb. 15 oz. Spleen weighed 3 lb. 15 oz., on its outer surface were punctures corresponding with those in abdominal wall, made by a sharp instrument. The examination was made by Dr. J. N. B. Wise, an authority on native customs, who made the following remarks:—"Death due to hæmorrhage from puncture of spleen. It is customary for *kabirajes,* under certain circumstances, to plunge iron needles into the spleen, when enlarged. This case was an unfortunate selection, as the organ was soft and vascular."

(*iii*). Dakka, 14th November 1880; Hindu female, 45, said to have died of wounds. A wound between scapulæ, six inches long, one broad, one deep. A second wound between tenth and eleventh ribs on left side, 6 inches long, 1½ broad, penetrating abdominal cavity. Peritoneum contained 4 or 5 coagula; stomach protruded through wound, contained half digested rice and *dal.* Spleen escaped through wound, completely divided in two parts transversely.

(*iv*). Backerganj, 6th May 1885; Hindu female, 25, said to have been killed by a spear. A punctured wound, 2¼ inches long by half an inch broad, behind left side of chest. It divided all superficial structures, and ninth rib, near its angle. The wound had penetrated and nearly divided the spleen, and penetrated the stomach at its cardiac end, making a wound 1½ inches long by half an inch broad. Pleural and abdominal cavities both contained quantities of effused blood.

(*v*). Twenty-four Parganas, 10th June 1887; Hindu male, 40, said to have been murdered. An incised wound four inches long, beginning $1\frac{1}{2}$ inches below inferior angle of left scapula, passing downwards and inwards, penetrating left thoracic cavity, and cutting lower border of tenth rib, lower border of left lung, diaphragm and spleen. Left pleura contained 8 oz. fluid blood and some clot; peritoneum contained a small quantity of bloody fluid and some clot; stomach contained a few particles of half digested rice; spleen, an oblique wound, two inches long, cutting through capsule, and one inch deep into organ, about two inches from inferior border.

(*vi*). Twenty-four Parganas, 27th October 1895; Hindu male, 30, said to have been shot. Two bullet wounds on left loin, $\frac{1}{4}$ inch apart, and one on left nates, one the size of an eight-anna piece, the other two the size of four-anna pieces; margins lacerated and blackened, all three wounds penetrate abdominal cavity, tenth and twelth left ribs fractured. Peritoneum contained three pints fluid and clotted blood; stomach healthy, contained about 3 oz. half-digested rice and *dâl;* spleen ruptured, no other viscus injured.

(*vii*). Mymensingh, 24th July 1879; Mussalman male, 20, said to have been killed with a spear. A punctured penetrating wound in epigastric region, below lower margin of right ribs, penetrating left lobe of liver, and entering spleen. No blood in abdominal cavity. Wound probably inflicted after death.

XII. Ruptures of Liver.—The liver is an organ which suffers far less often from rupture than the spleen, probably owing to the fact that it is much less liable to great enlargement. While the whole series of 9,876 cases show 304 cases of rupture of the spleen, in nineteen of which the liver was also ruptured, while in 285 that organ was intact; they give only twenty cases in which the liver was ruptured and the spleen uninjured. Adding the nineteen cases in which both organs were ruptured, we get 39 cases in all of rupture of the liver, or 0-39 per cent. of the whole series; and one rupture of the liver to seven and a half of the spleen. The nineteen cases in which both liver and spleen were ruptured have already been considered under section No. VIII. The other twenty may be briefly noted as follows:

Midnapur, four cases.

(*i*). Run over by a buggy: 6th left rib fractured, three ruptures of liver, spleen atrophied and indurated.

(*ii*). Cause not stated; liver slightly ruptured.

(*iii*). Run over by cart; a rupture, 6 inches long, on upper surface (spleen not mentioned in cases ii and iii).

(*iv*). Slipped and fell, run over by Jagannath car; three left and five right ribs, and both bones of left leg fractured; both pleuræ ruptured; blood in pleural cavities; lower lobe of right lung ruptured posteriorly; diaphragm ruptured on right side; liver ruptured posteriorly; spleen healthy.

Dinajpur, one case—

(*v*). Killed by a kick; liver ruptured.

Dakka, five cases.

(*vi*). Killed by a *dhao*; several small gashes on face, 7th to 9th left ribs fractured; abdominal cavity contained a quantity of dark fluid blood; liver, an irregular tear, 3 inches long, right lobe, a smaller tear in left lobe; spleen normal size, uninjured.

(*vii*). Run over by a cart; a rupture of under-surface of liver, close to gall-bladder, 2 inches long.

(*viii*). Killed by kicks and blows of fists; 2nd to 10th right, and 2nd to 11th left ribs fractured; liver healthy, a star-shaped rupture of under surface of right lobe, 3—4 inches long, 1 inch deep; spleen healthy, uninjured.

(*ix*). Knocked over by a horse (a child of 6); liver extensively ruptured in three places, all other organs healthy.

(*x*). Beaten to death; a semi-circular rupture, 2½ inches long, ½ inch deep, on upper surface of right lobe.

Purnea, five cases—

(*xi*). Run over; a rupture, 5 inches long, one deep, on convex surface of right lobe of liver.

(*xii*). Died in a fit; four or five longitudinal lacerations, each about 2 inches long, 1/12 inch deep, on convex surface of right lobe of liver.

(*xiii*). Killed by a fall; a triangular rupture, 2 inches long and 1 inch deep, of right lobe of liver.

(*xiv*). Cause not stated; liver soft and flabby, two small linear ruptures, each ½ inch long, on free edge, plugged with recent blood clot; spleen enormously enlarged, not ruptured.

(*xv*). Run over by a cart; a rupture ¼ inch long, ⅛ inch deep, on convex upper surface of left lobe of liver.

Backergunj, two cases—

(*xvi*). Beaten to death with a *lathi;* 2nd to 4th and 7th to 9th right ribs broken, lacerating pleura; liver, a rupture, the size of a rupee, on upper surface, caused by broken ribs.

(*xvii*). Beaten to death; a rupture, about 3 inches long, on posterior surface of liver; kidneys embedded in dark coagulated bl [illegible] margin of right kidney a little ruptured.

Mymensingh, one case—

(*xviii*). Said to have died of suicide by cut-throat; a wound, with ragged edges, 2 inches long, 1½ inches wide, ¾ inch deep, over thyroid cartilage; liver enlarged, contained several abscesses, three small tears on posterior surface of right lobe.

Bhagalpur, one case—

(*xix*). Cause not stated; a tear in line of longitudinal fissure of liver, reaching from upper to lower surface, the two lobes being kept together only by the capsule.

Twenty-Four Parganas, one case.

(*xx*). Killed by a kick; a rupture 1 inch long, ½ inch deep, on under surface of right lobe of liver, at anterior margin, running transversely.

The most common causes of rupture of the liver, including both those with and without rupture of the spleen, were as follows:—Run over, 11 (more than one-fourth of the whole); kicks and blows with the fist, 6; beating, 5; falls, 4; while in 7 the cause was unknown or not stated.

This too lengthy paper may be brought to a close with a short note on a case of rupture of spleen in a cow, which I examined at Barisal (Backerganj), on 14th June 1888. There was effusion of blood in the muscles all along the left side of the back, especially behind the left foreleg; a fracture of the bones of the skull, running from the upper end of the left nasal orifice upwards and backwards for 6 inches, a little soft brain matter had exuded from this fracture; fracture of the 7th, 9th, and 10th left ribs; the peritoneum contained a pound of dark blood clot in splenic region, two or three pints of dark fluid blood, and a quantity of chewed grass. The stomach was full of chewed grass, there was an extensive rupture of the right side of its largest cavity. The spleen was ruptured, the laceration extending for a foot along its outer side.

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[illegible] for vendors to [illegible], but were the punished, and the offence proclaimed, as already observed, by of tom-tom, the resort to cheating would at once be prevented not at least abated. The punishment inflicted, operating as a warnin

A case as this, should have been taken up by the Municipality t maintain the *status* of its own market, so that mal-practices be put down, as any other complaint, arising from neglect or inattention.

In saying so, we wish to observe, that, in regard to bazar tricks, the Municipality is no more to be blamed than frequenters; as neither can be supposed to encourage them. But *palming* we loathe. It is an innateness in low shop-keepers and stall-holders, to check which strenuous effort should be made for the common good, and not by passiveness permit what by strictness shoul be prevented. That a good thing demands a good price we admit, but to be imposed by talk or trick, and thus be made to pay a high value for an indifferent-article, is what cannot but be objected.

In the *Indian Daily News* of 30th September last, an evil—want of cleanliness was noticed ; such, as other complaints will always be heard, until a better state of things can be introduced. In a arge market as this, the supervision accorded is not adequate ; hence ead of one overseer, were two or three appointed upon a reduced the work would better be done. In the "field of labour," the marked, [illegible] sometimes sleeps, [illegible] on good, it should be kept awake.

Touching this case, a few words seem desirable.

A person, as reported, went to the Municipal market and bought few crabs as alleged with roe. On the same being taken home and dressed, were found to be male crabs, but in the apertures on their shells, bits of roe were stuck on to impart an appearance, that, they were roe-crabs. The next day the purchaser complained of the imposition to the Bazar overseer, who replied, that, he could not take notice of the matter; yet he could do one thing, which he did not. He could make over the party charged to the Police, because it was clear case of cheating.

Before proceeding further. Let us see what is meant by cheating. To cheat means to defraud—to pass a bad thing as good by some trick. Now in the crab-case, clearly a trick was practised; and strange no notice was taken of the matter so as to have the party punished and thus an example made.

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[1] *Indian Daily News*, August 31st 188

[2] *Dormiunt aliquando leges, nunquam moriuntur.*

nd for good reason, because to do anything,
ould do it with heart and hand—success is
l be the consequence—

gh mutual intercourse and mutual aid,
t deeds are done and great discoveries made ;
e wise new wisdom on the wise bestow,
Whilst the vain thinker's thoughts come slight and slow.”

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